The Canadian
Medical Association Journal

Vol. XXIV TORONTO, MAY, 1931 No. 5

An Address

ON

BACTERIOPHAGY AND RECOVERY FROM INFECTIOUS DISEASES*

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WE know through common experience that certain species of animals are completely refractory to certain diseases which decimate other species. No one has ever seen, for example, in the course of the most terrible epidemic, a single rabbit contract cholera or a single guinea pig contract typhoid, although men were dying by thousands. The guinea pig and the rabbit, as indeed all other animals, are refractory to these two diseases. *They enjoy a natural immunity.*

We know, likewise, by common experience, that a great many of the infectious diseases do not recur or, at least, recur but rarely. It is unusual for a man who has recovered from an attack of typhoid, for example, to contract this disease a second time. A first attack of an immunizing disease leads, therefore, within the individual, to the appearance of a new character. *He enjoys an acquired immunity.* This immunity, very strong at the beginning, gradually diminishes at a rate more or less rapid in accordance with the disease causing it. In certain cases it disappears completely after a greater or less length of time.

There is, in addition, a third type of immunity. In certain of the chronic diseases, such as tuberculosis or syphilis, it is very evident that the patient does not enjoy an acquired immunity, since the pathogenic organisms continue to develop within the lesions, but he possesses, nevertheless, a new character, for reinfection can not occur so long as he remains the carrier of the specific germs. This immunity, certainly different from acquired immunity, since it ceases at the moment when the specific organism disappears from the lesion, may be termed pathogenic immunity or, better, *symbiotic immunity.*

It is only natural *a priori* to consider the phenomenon of recovery as being within the limits of immunity, but this has yet to be experimentally proved. It is somewhat curious to note that this question of recovery in infectious diseases, a question which would seem fundamental, has always been passed over in silence. Everyone has implicitly admitted that recovery was a natural consequence of the acquisition of immunity. The reason for this conclusion can readily be understood for all present day immunology is founded upon laboratory experiments, carried out with guinea pigs and rabbits. These animals have been inoculated with cultures of different bacteria, cholera vibrios, typhoid bacilli and others for which they possess an absolute natural resistance. In them have been produced artificial infections which bear no relationship with natural diseases. It is in this way that nature has been disobeyed, for such studies can only lead to an imaginary solution. Let us illustrate the fact by an example.

Cole and Dochez have found that an adequate amount of anti-pneumococcus serum, type 1, is able to save the life of a mouse previously injected with a million fatal doses of type 1 pneumococcus

* Delivered before the Montreal Medico-Chirurgical Society on February 20, 1931.

culture, thus the serum is highly valuable. Well, experimenting with the same serum, Cole treated 431 cases of type pneumonia with a death rate of 10.2; no control series was studied. Locke had a death rate of 17 amongst the treated and exactly the same death rate amongst the controls. In Wadsworth's series the death rates amongst treated and control were respectively 18 and 19 per cent. My conclusion is that the serum under experiment has been very successful in the artificial pneumonia in mice, and worthless in the natural pneumonia of man. In reviewing the literature I could quote hundreds of examples emphasizing the fact that artificial infections induced in laboratory animals bear no relationship with natural disease in man. For ten years I have fought to emphasize this fact, without any success. The same pseudo-experimental method continues and will continue to be current practice in the study of immunology.

In so far as recovery is concerned, a simple observation of the facts suggests that it cannot be the consequence of an acquired immunity. As a matter of fact all of the infectious diseases, not to mention the pyogenic infections, are not immunizing; it is certain that bacillary dysentery can recur at frequent intervals, and that the relapses are often as serious, if not more serious, than the initial attack. As for cholera, it is not rare to see recurrences, and all authors of the nineteenth century who have seen epidemics in Europe have been unanimous in considering cholera as a non-immunizing disease. On the other hand, in the case of those diseases which are actually immunizing, if recovery results from the acquisition of immunity, how are we to explain satisfactorily the relapses which take place during convalescence, at the moment when the immunity should be at its maximum potency? Take for example the case of typhoid fever. Relapses are not uncommon; they occur during convalescence, generally within twenty days of the abatement of the symptoms, and, far from being benign, they are severe and often fatal. Well, at the moment of the relapse the antibodies are present at their highest potency. This proves that antibodies do not provoke the recovery, and, furthermore, that immunity was not yet established at the moment of the recovery from the first attack. These observations suggest the hypothesis that recovery can take place without the phenomena of immunity intervening and that acquired immunity, far from being the cause of the recovery, must appear from ten to twenty days after the recovery. In a word immunity must be not the *cause* but the *consequence* of the recovery.

In order to verify this hypothesis, suggested by observation, it is necessary to study what takes place within the patient at the moment of recovery, and to do this by adopting an experimental method which conforms to the principle of obeying nature. It is necessary to study the man or the animal afflicted with natural disease, to see the phenomena which take place within him at the time of recovery and throughout the course of convalescence. This method is the only one which can provide a true solution to the problem. From the beginning of my study of bacteriophagy I have been struck by the fact that the appearance within the body of the patient of the principle which leads to bacteriophagy coincides with the time when the symptoms ameliorate. Absent during the disease, bacteriophage appears constantly in convalescents. *Bacteriophagy is thus contemporaneous with recovery.*

In vitro, bacteriophagy consists of the following. Let us take a few drops of stool derived, for example, from a convalescent from bacillary dysentery, Let us emulsify this in about 20 c.c. of sterile bouillon and filter it through a porous porcelain filter, such as the Chamberland, or through a silica candle, such as the Berkefeld. Let us add to a young bouillon culture of the dysentery bacillus a drop of this filtrate, and place the tube in the incubator. At first the bouillon appears cloudy, but after a few hours we note that it becomes clearer and clearer, and, finally, after about 12 hours, sometimes more quickly, it becomes perfectly limpid. At this time all of the bacilli are dissolved.

Let us take, next, a new, fresh culture of dysentery bacilli and add to it a drop of the limpid fluid which remains after the disappearance of the bacilli from the first mixture. Let us place this second tube in the incubator. We will find that the phenomenon repeats itself, for after a few hours all of the bacilli are again dissolved and the liquid is clear. We may then remove a drop of the second dissolved culture and introduce it into a third culture of dysentery bacilli. Once more the phenomenon of dissolution takes place. One might in this manner continue the passages indefinitely, introducing into each new, fresh culture of dysentery bacilli a drop of the preceding one after all of the bacilli have been dissolved. Far from diminishing in intensity

in proportion to the degree of dilution of the initial drop of filtrate the phenomenon becomes, on the contrary, more intense. Thus it is that after more than a thousand successive passages I have been able to obtain the complete dissolution of the 2,000 million bacilli contained in 10 c.c. of bouillon by adding the infinitesimal quantity of a billionth of a cubic centimetre of the preceding dissolved culture.

Such experiments demonstrate that the principle which destroys the bacteria, and to which I have given the name "Bacteriophage," reproduces itself in the course of its action. The phenomenon of bacteriophagy consists essentially, then, in a dissolution of bacteria under the influence of a principle which reproduces, the latter phenomenon, that is, reproduction, being directly related to the bacteria which are dissolved.

Various questions now arise. Is this bacteriophage found only by chance in the intestinal tract of certain dysentery patients, or is it a constant occurrence? We will return to this question later. Is the phenomenon of bacteriophagy limited to the dysentery bacillus? I have been able to establish the fact that bacteriophagy is a general phenomenon. It has been possible to isolate races of bacteriophage leading to the dissolution of bacteria belonging to very varied species, such as *Eberthella dysenteriæ, paradysenteriæ, typhi, paratyphi*, and *sanguinaria; Escherichia coli; Salmonella schotmülleri, pullora, suipestifer*, and *typhi-murium; Proteus vulgaris; Vibrio comma; Pasteurella pestis* and *bovis; Corynebacterium diphtheriæ*, and *B. subtilis*. Other investigators have isolated bacteriophage races active with staphylococci, streptococci, and pneumococci, and even with bacteria parasitic in plants, such as *Rhizobium radicicolum, B. tumefaciens*, and *B. carotovorus*. The diversity of the bacteria attacked warrants the belief that the phenomenon is, indeed, general, perhaps involving all bacteria.

Various experiments show that the bacteriophage exists in corpuscular form. One such experiment, the most simple, consists in adding to 10 c.c. of a well-grown bacterial culture an infinitesimal trace, a millionth of a cubic centimetre, of a filtrate containing active bacteriophage. If a drop of this culture is spread immediately on agar we will obtain, after incubation, a growth of bacterial culture over the surface of the media, and this will be spotted with circular bare areas which appear to be perfectly sterile and are visible to the naked eye. Each of these plaques represents a colony of bacteriophage made up of millions of corpuscles, all the issue of a single corpuscle deposited on the agar at the time of spreading. Each corpuscle has commenced to multiply at the expense of the neighbouring bacteria. The destruction of the bacteria and the simultaneous multiplication of bacteriophage corpuscles is so active that after a few hours the area of destruction is so wide as to be visible to the unaided eye.

For lack of time I will not discuss all of the chacteristics of the bacteriophage phenomenon for it is in reality extremely complex. I will restrict myself to some of the essential ideas. The bacteriophage corpuscle is a living, ultramicroscopic being, as is proved by the fact that this corpuscle dissolves bacteria through the agency of a ferment which it secretes. The secretion of a ferment implies a metabolism and this is an essential character of living beings. A bacteriophage is, therefore, of necessity a *virus*, a *parasite* of bacteria.

In its action each bacteriophage is not specific, for a given bacteriophage may parasitize and dissolve bacteria belonging to different species, sometimes as unrelated as the streptococcus and the colon bacillus or even the plague bacillus and *B. typhosus*. The characters of each strain of bacteriophage are variable. There are races of bacteriophage able to attack many species of bacteria, others which attack but a single species or even but a single bacterial strain. Certain of them are so potent that they are able *in vitro* to destroy and to dissolve within less than two hours all of the bacteria contained in a culture, while others exercise but a scarcely perceptible, partial action.

Adaptability is an exclusive property of living beings and the bacteriophage possesses this character to a very high degree. There are, however, in this respect differences between different races, for certain bacteriophages adapt themselves very readily, while others do so very slowly. In so far as the present discussion is concerned, the most important character of adaptability is represented by the faculty which each strain of bacteriophage possesses of adapting itself to the parasitism of new bacterial species which heretofore were not attacked. This experiment of adaptation can even be effected *in vitro*. It is possible, for example, to adapt a bacteriophage which originally, at the time of isolation, was active only upon *B. coli* to the

parasitism of *B. typhosus*. This property of adaptation is rapidly lost in races of bacteriophage maintained under laboratory conditions.

There is another important consideration. When attacked by a powerful bacteriophage the bacterium succumbs, but if the potency of the bacteriophage is less the bacterium is capable of resistance, in which case it then contracts a true chronic disease accompanied by profound modifications in its characters. With regard to the subject now under discussion the most important of these modifications involves the variation in bacterial virulence, and this is usually attenuated and may completely disappear. As we shall see later, this phenomenon of variation of the virulence of bacteria resisting the action of bacteriophage is very important in relation to the cause of infectious diseases. The resisting bacteria live for an indefinite number of generations in symbiosis with bacteriophage, that is to say they suffer from a chronic disease caused by bacteriophage, for all the modern researches on symbiosis (which is a very general phenomenon in nature) lead to the conclusion that symbiosis is always a chronic disease in which the resistance of the host balances the virulence of the parasite. The symbiosis continues as long as the two antagonistic powers are perfectly balanced; if the virulence of the parasite, or the resistance of the host increase, symbiosis is broken in favour of the former or the latter.

In brief, these are the principal characters of the very complex phenomenon of bacteriophagy.

We have seen that the principle which causes bacteriophagy can be uniformly isolated from the convalescent, and we are able to conclude that bacteriophagy *in vivo* is contemporaneous with recovery. Is it the cause? In the first place let us state that the bacteriophage virus does not appear spontaneously at the moment of recovery. Experiment demonstrates that the bacteriophage exists in the intestinal content of all healthy individuals, where it grows at the expense of the saprophytic bacteria, of *B. coli* in particular, which are daily ingested with the food. Thanks to its faculty of adaptation, the normal intestinal bacteriophage becomes able to parasitize foreign bacteria which may become implanted, not only within the intestines but in any organ whatsoever, for experiment shows that the bacteriophage passes readily into the circulation. In order to prove if the bacteriophage is really the cause of a recovery it is only necessary to study patients affected with acute infectious diseases from the beginning of the attack up until the end of convalescence. This is what I have done for various human and animal diseases. Here is, in short, what I hav observed. The condition of the patient depends upon the behaviour of the bacteriophage and recovery takes place only when the destroying potency of the bacteriophage reaches an intensity sufficient to lead to the bacteriophagy of the pathogenic bacteria.

I am not able, for lack of time, to describe the many studies which I have made upon this subject during different epidemics in Europe, in Indo-China, and in India. Here are, as an example, the results of the studies made upon cholera. These results are expressed in the form of curves,* with the solid line representing the severity of the disease as determined by the different symptoms. Ten represents the maximum severity where all of the symptoms are present to the highest degree, 0 indicates the absence of symptoms, that is, recovery. The dotted line presents the curve of potency of the bacteriophage isolated from the patient at the same time in its action upon the cholera vibrio. Between 10 and 6 on the scale, tests of potency *in vitro* show that there is a complete bacteriophagy in a time varying from 2½ hours (10) to 12 hours (6); below 6 the bacteriophagy is only partial, becoming less as the coefficient drops: 0 represents no activity upon the cholera vibrio. As may be seen here from these curves, not only is the phenomenon of recovery strictly related to the behaviour of the bacteriophage, but the condition of the patient at a given moment is always a function of the activity of the bacteriophage. If bacteriophagy does not take place the patient dies. In bacillary dysentery, in typhoid and the paratyphoid fevers, in different animal septicemias, and in human and murine plague the examination of patients reveals the same relationship between recovery and bacteriophagy *in vivo*.

It is necessary, however, to emphasize the fact that the phenomenon of bacteriophagy *in vivo* is far more complex than that occurring *in vitro*. In the latter case only two beings are involved, the bacterium and its parasite, the bacteriophage. *In vivo* a third factor enters—the host. In my first book on bacteriophage, published in 1921, I described experiments which tend to show

* This refers to lantern slides displayed at the lecture.

that opsonins are in reality the lysins secreted by the bacteriophage corpuscles during bacteriophagy. Let us take two tubes containing like mixtures of sensitive bacteria and leukocytes, and let us add to one of these tubes a suspension of bacteriophage or a solution of lysin freed from bacteriophage corpuscles. We will find that phagocytosis is from five to fifty times more active in the presence of the lysin that it is in the control tube. The opsonic power of bacteriophage has since been confirmed by various investigators, including Gohs and Jacobsohn, Weiss and Arnold, Nelson, and Smith.

This opsonic action tends naturally to prevent the formation of secondary cultures which are so frequent *in vitro*, but, even though these may be formed, a third phenomenon intervenes which also depends entirely upon the bacteriophage. I have stated above that bacteria which resist the action of bacteriophage undergo modifications in their characters and principally in that of their virulence, which generally becomes attenuated and often disappears completely. This it is easy to prove experimentally. Three distinct phenomena, therefore, take place *in vivo*—bacteriophagy itself, a powerful opsonic action, and an attenuation in the virulence of the pathogenic bacteria. These three are induced by bacteriophage and all contribute toward recovery.

But recovery or death are not the only two possible issues. There is a third one, the passage to a chronic state in which the symptoms are more or less apparent, sometimes even lacking, as is the case in "carriers", which are to be considered as two chronic patients. We know, for example, that in the typhoid carriers, the gall-bladder is infected. The passage to chronicity is due to the fact that in the body, as well as *in vitro*, bacteria are able to resist the bacteriophage and to form a symbiosis. In such a symbiosis the characteristics of the bacteria are transformed, as I have stated before. In the case of certain bacteria, as cholera vibrio, the virulence is utterly destroyed, with the result that cholera carriers are absolutely harmless; in the case of other bacteria, such as typhoid bacilli, the virulence of the symbiosis is variable. I have recently performed experiments with the bacterium of the same group, *Salmonella typhi murium*, a very convenient bacterium, for it is possible to provoke in mice a natural disease by oral administration of a minute quantity of culture. I have obtained in the test tube a whole series of "mutations" of the salmonella, under the action of bacteriophage, each of these "mutations" is a "symbiosis". I have tested the virulence of eight of these: two are completely avirulent; two have a virulence about the half of the primitive pure salmonella; four have a very low virulence and provoke, not an acute disease, as is the case with the primitive salmonella, but a disease lasting several weeks.

For lack of time, I have not the opportunity to discuss the relationship between acute and chronic diseases from one part of the behaviour to the symbiosis bacteria-bacteriophage, from another part, anyhow, the experiments with *Salmonella typhi murium* are sufficient to show that such relationship exists. In brief, acute diseases are causes by "ultrapure" bacteria, chronic diseases are caused by a symbiosis formed between bacteria and bacteriophage.

All these studies tend, therefore, to show that recovery is in no way derived from a phenomenon of immunity as had been believed up to the present time, but rather that it is a direct result of bacteriophagy *in vivo*. It is, furthermore, easy to prove this conclusion, for it may be done by means of crossed experiments. It is possible, easy indeed, to introduce into a culture of the pathogenic bacterium a trace of a suspension of a virulent bacteriophage; the bacteria are attacked and destroyed, and meanwhile the bacteriophage multiplies. That which was at the beginning a culture of bacteria becomes, after a few hours, a culture of bacteriophage. Let us administer to a patient, at the onset of symptoms, a few drops of this culture of bacteriophage. Bacteriophagy must take place *in vivo* and recovery must follow. The patient will not be forced to take the chance of his own intestinal bacteriophage undergoing an adaptation, for we can inaugurate, at the beginning of the disease, the natural processes of recovery.

I will state briefly what has been done up to the present time in this direction. From 1919 onward I have made experiments upon patients affected with bacillary dysentery, causing each patient to ingest two cubic centimetres of a culture of bacteriophage having a high virulence for dysentery bacilli. In all cases, without exception, all of the morbid symptoms disappeared within a few hours, in from four to twenty according to the case, and the next day the patient was definitely convalescent. Since that time this method of treatment has been applied on a large scale, principally in the Soudan and in Brazil.

In Brazil, as the result of control experiments conducted by da Costa Cruz, who obtained results identical with those I had reported, the Oswaldo Cruz Institute of the Brazilian Government has prepared, since 1924, cultures of a virulent bacteriophage for the dysentery bacilli. These have been placed into two cubic centimetre ampoules and distributed to hospitals, to government health officers, and to all physicians who have requested them. This mode of treatment has quickly supplanted all others, including the use of antidysenteric serum, which has been abandoned. The results obtained in the first 10,000 cases have been published and only two failures are recorded.

As for the Soudan, this phrase, summarizing the results, appears in a letter of the Director of the Public Health Service. "The results of treatment of bacillary dysentery with it have been little short of miraculous." A single failure, the case of an infant already moribund when brought into the hospital, occurred among several hundred cases treated.

I must admit that several experimenters have not obtained the same favourable results. As we shall see later, the power of the phage utilized for the treatment is an essential factor of success. It is not sufficient to administer any bacteriophage in order to obtain recovery; the *sine qua non* of success is to administer a *powerful* bacteriophage. It seems that many authors have not yet realized that this condition is imperative. As an example, I have quoted the paper of Riding, who experimented in the Soudan, and has reported a complete failure. He states that he utilized a bacteriophage which was furnished to him by myself. This statement is misleading, for at the time indicated (autumn of 1927), I could not send any bacteriophage from Egypt, as after the month of March I was in India experimenting with cholera. I suppose that the bacteriophage received by Riding had been prepared by the bacteriologist from my service in Egypt during my absence and I do not know what was its value. But what is still more surprising is that Riding alluded in his paper to the letter summarizing the results obtained the year before with bacteriophage, which I had really prepared, and treated it as an "absurd statement", but without indicating, who made the statement and where the experiment had been performed. Readers would have been certainly cautious about the failure of Riding if he had had the honesty to say that the experiment had been performed the preceding year in Khartoum, and that the "absurd statement" had been written by the Director of the Medical Service of the Soudan.

In the year 1927, while in India, as the result of the experiments of which I have spoken, I attempted the treatment of Asiatic cholera. These attempts were made in the Punjab, on natives cared for in their homes and to whom no other medication was given. Each patient received an initial dose of two cubic centimetres of a virulent bacteriophage, and with the family a second dose of four cubic centimetres diluted in one hundred cubic centimetres of water was left with instructions to give it to the patient by spoonfuls during the three or four hours following. I should explain that I merely furnished the cultures of bacteriophage. Treatment was carried out by Major Malone, of the Indian Medical Service, assisted by the other officers of the Service. As it was impossible to enforce any one mode of treatment, the family of the patient was free to accept or refuse it, in the latter case usually resorting to the prescriptions of the Hindoo medicine man. The majority of the patients for whom authorization was granted were found in a critical state; indeed, it was only because of this that parents, despairing of saving them, accepted the new treatment. As a control series we have taken those cases in which the bacteriophage treatment was refused. In spite of these extremely unfavourable conditions the mortality in the controls was 62.9 per cent, and among those treated with bacteriophage, 8.1 per cent. Since then Colonel Morison of the Indian Medical Service has applied the same mode of treatment in epidemics of cholera in Assam, and, working also in the villages, he has obtained comparable results, the mortality varying from 8 to 11 per cent among the treated, while the mortality among those not treated by bacteriophage varied from 60 to more than 80 per cent according to the epidemic. Asheshov has treated patients in the hospital by applying bacteriophage treatment by the intravenous route and he has succeeded in lowering the mortality to about 3 per cent.

Two experimenters, Tyler in Assam, and Souchard in Indo-China, have recorded a complete failure, but it appears from their own texts that the strains of the bacteriophage they have utilized had been in cultivation in the laboratory for a long time and were of no potency. I have always emphasized that any attempt of

treatment with such a phage would lead to complete failure.

Let us pass to another disease which has a high mortality, which has also furnished the most striking results. In 1926, while in Egypt, I treated four cases of bubonic plague, injecting the bacteriophage into the buboes; all four of the patients recovered. In the course of an epidemic which occurred last year in Senegal, Dr. Couvy, Director of the School of Medicine at Dakar, faced with the non-effectiveness of antiplague serum in severe cases of the disease, attempted the treatment by bacteriophage, utilizing a strain isolated from a convalescent. In order to ascertain in a definite manner the value of this treatment he applied it solely to cases of extreme severity, in whom death seemed to be certain within a short time. "Either they appeared moribund after failure of the serum treatment, or it was given at once to patients whose condition appeared desperate," as he stated in his paper. Among such patients the mortality is practically one hundred per cent, but with bacteriophage treatment he obtained 15 recoveries among 21 cases treated. In the course of this epidemic 8 cases of septicæmic plague were treated by serum before the trial of bacteriophage. All of these died. Two cases treated by bacteriophage recovered, in spite of the fact that the bacilli were so abundant in the blood that they could be disclosed by direct microscopic examination. Of nine cases of pneumonic plague treated by serum all died (as is well known, pneumonic plague is without exception fatal,) while one case treated with bacteriophage recovered. "The action of bacteriophage", states Couvy, "manifests itself by an abrupt fall in the temperature; often the defervescence is violent, a fall of several degrees. The general condition rapidly improves. The antitoxic action is most sharp and the hallucinations quickly give place to calm. The periadenitis disappears, the buboes retrogress, and convalescence takes place within a few days. One never sees the interminable suppurations so frequent with other methods of treatment. There is no necrosis or gangrene."

Let us state in passing that the antitoxic action manifested so quickly and effectively by the bacteriophage is absolutely clear cut, although it is difficult to explain in the present state of our knowledge. I have observed it not only in plague but in other toxic diseases which I have treated with bacteriophage, cholera and bacillary dysentery among others. Gerard, in Madagascar, has tried the administration of bacteriophage in three cases of primitive pneumonic plague. Two patients recovered, the condition of the third showed marked improvement, but he died from a relapse. Anyhow, these results are very promising, for the prognosis in primitive pneumonic plague is fatal, without any exception.

Let us pass on to other diseases having a high mortality. We know that recovery is rare in staphylococcus septicæmia, the mortality being about 99 per cent. In 1929, at my suggestion, Dr. Davioud treated a hopeless case in the following manner. Five cubic centimetres of a suspension of staphylococcus bacteriophage was diluted in 500 c.c. of physiological saline. This was all introduced intravenously, the period of injection occupying about one hour. This is, indeed, the technique which I have recommended for all intravenous injections of bacteriophage, and it is possible to inject in this manner without danger of immediate shock as much as 25 c.c. of a suspension of bacteriophage. Two hours after the injection a marked pyrexia occurred with chills. Upon the morning of the next day the temperature was normal and convalescence began. Eight days later the patient left the hospital, recovered. When seen ten months later she had enjoyed perfect health. Since then several other cases of staphylococcus septicæmia have been treated in the same manner in the hospitals of Paris with a like degree of success.

Dutton, the first, I believe, who has treated with success cases of streptococcus septicæmia, and Raiga, has very recently treated this condition. Since here defervescence did not take place as quickly after the injection as in the preceding cases, upon my advice he made a series of ten intramuscular injections of 5 c.c. each, with an interval of 24 hours between each injection. Here is an example. A woman of 28 years, with a puerperal infection was treated simultaneously with septicæmine, pyoformine, immuno-transfusion, fixation abscesses, and anti-streptococcus serum. On the third of July, confronted with the failure of all these methods and by the fact that the patient was gravely ill, the physician in charge requested Dr. Raiga to apply bacteriophage. The temperature was then 41° C. He gave an intravenous injection of 10 c.c. of streptobacteriophage diluted in 500 c.c. of physiological saline. No reaction followed. In spite of the fact that the temperature continued during the following day to vary between 40 and

41°, and the blood cultures remained positive, the condition of the patient improved and the appetite returned. Since two injections of anti-streptococcus serum had been made in the two flanks there had developed in these regions a diffuse phlegmon. On the right the infiltration had progressed toward the anterior region of the thigh and had assumed the appearance of a gangrenous phlegmon. Purulent fistulæ extended to the knee. On the 18th of July a series of 10 daily intramuscular injections of 5 c.c. of streptococcus bacteriophage were commenced. On the 23rd of July the slough was removed. Upon the 31st of July the blood culture became negative and the temperature progressively lower. The patient left the hospital cured on the 31st of August.

Let us turn to still another type of disease—typhoid fever. Since 1923 many papers have appeared upon the subject of its treatment by bacteriophage. Some of the authors (Hauduroy, Alessandrini, and Doria among others) reported excellent results, while with others (Wolff, for example) the results were negative. I believe, however, that I have recently discovered the cause of these differences. I will speak of them shortly when I consider the general conditions governing treatment by bacteriophage.

For two years I have studied this question and have made experiments in many centres in France. One experiment, involving about 150 cases, shows that if one administers by mouth a suspension of bacteriophage (I have used a mixture containing many strains of typhoid bacteriophage and several strains of coli bacteriophage) in a dose of 2 c.c. repeated every 4 hours, one does not obtain a cure in the strict sense of the word, but the disease develops in the form of a simple fever without complications. The stools are formed and normal, the patient does not complain of any disturbance, and regains his appetite. None of these cases have died. On the other hand, when one applies bacteriophage by the intravenous route, in the manner indicated above, one induces in about half of the cases a strong thermic reaction with chills followed by a rapid fall in the temperature, which reaches normal in 48 hours. In the other half of the cases no reaction takes place and the disease follows its normal course. In view of these results, and it is in this direction that I intend to continue my studies, it would seem that an intravenous injection of typhoid bacteriophage might be given, continuing the treatment in the cases where the salutary reaction does not take place, either by administration by mouth, as in the first series of cases mentioned, or by serial intramuscular injections, such as those used in the streptococcus septicæmias.

In infantile diarrhœas I have applied treatment by bacteriophage in several hundred cases, using a mixture containing a large number of races of bacteriophage active upon the different pathogenic bacilli which may be found in the intestines of patients,—dysentery bacilli of the Flexner or Hiss types, Morgan bacilli, and *B. proteus*. Bacteriophage is administered by mouth in doses of 2 c.c., this being repeated every two hours until the stools have become normal. The effect is usually very prompt and in more than 80 per cent of the cases recovery is obtained within twenty-four hours. The results would certainly be still much more favourable if new strains of bacteriophage were added, for it seems that infantile diarrhœa is not a definite entity from the standpoint of etiology but may be caused by bacteria of various types. By using a mixture containing bacteriophage capable of acting upon all of those bacteria which cause infantile diarrhœa one might hope to be successful in 100 per cent of cases. This appears the more probable, since I have found that the efficiency of the treatment increases as new races of bacteriophage are added to the preparation used for the treatment of this disease.

I will only mention here the treatment of urinary infections due to colon bacilli, for a great many authors have studied this problem and have published their results. It may be said that in acute infections prompt recovery is the rule following intravesicular injections of coli bacteriophage active for the colon bacillus causing the disease. It must also be said that recovery is the rule in these infections whatever the treatment employed. In chronic cases a review of the results indicates that about 60 per cent of the cases recover when treated by instillation into the bladder in conjunction with a series of subcutaneous or intramuscular injections. This figure is raised to about 85 per cent if the instillations are made, not into the bladder but into the pelvis of the kidney involved. It should be added that it has not yet been possible to isolate strains of bacteriophage acting upon all the cultures of coli which may be found in chronic cases. In a given case of chronic infection caused by this organism it is first

essential to determine whether the bacillus of the patient is attacked by a stock bacteriophage. If it is not, it is essential to utilize an "autobacteriophage". This difficulty is not present in other diseases, for with the exception of *B. coli* races, we now possess strains of bacteriophage which are polyvalent.

Bacteriophage treatment of staphylococcus infections has been very extensively applied. Since the general principle of the method consists in placing the bacteriophage in as intimate a contact as is possible with the pathogenic bacterium it is essential in staphylococcus infections to inject directly into the focus. Since such injections may often be very painful one may, as Jaquemaire has shown, mix with the staphylobacteriophage a quantity of a suitable anæsthetic, novacaine for example. This treatment has, up to the present, been applied in thousands of cases. For example, Raiga alone has reported the results of this treatment on more than 1,000 different cases, Thurman Rice, 300 cases. The series of Larkum is very large, and Halphen has used the treatment in 600 cases of tonsillar abscesses, etc. Other types of staphylococcus infection have been treated with equal success, such as furunculosis, carbuncles, paronychia, abscesses of all kinds, of the gums, of the breast, and rectal abscesses. It has been used in phlegmons, in infected wounds, and in osteomyelitis. All investigators who have used this mode of treatment in these different infections are unanimous in stating that the results obtained are far superior to those secured with other methods. This is especially true as regards the rapidity of the action and the absence of scars, which, of course, are very significant in connection with lesions of the face. One interesting fact recorded by several authors, which I also have observed upon several occasions, is that very quickly after the first injection of bacteriophage into the pyogenic focus the pain disappears completely. The patient who, prior to the intervention, was continually moaning, after one or two hours experienced a sensation of euphoria. This action is especially striking in the case of certain very painful abscesses, those involving the anal region for example. This is not a specific action in particular patients but is a general effect.

One other type of infection should be mentioned briefly, that is, the treatment of chronic bronchitis, of angina, and of coryza by means of a mixture of different races of bacteriophage active for those organisms which may be isolated from the throat in these conditions. The bacteriophage is here applied by spraying the nose and throat. I have seen the results in about 300 cases of these different conditions treated in this way and in from 60 to 70 per cent recovery was rapid. As is the case for other diseases in which the specific germ varies, the results would certainly be improved with the addition of new strains of bacteriophage to the stock.

I must end this lecture in which, for lack of time, I have been forced merely to cite facts without entering into the details of each particular case, with a few general considerations.

Treatment by bacteriophage has been, I believe, demonstrated to be the specific treatment *par excellence*, since it leads to recovery through a mechanism identical with that of natural recovery. Because of its nature one may hope to obtain results only when the bacteriophage administered is endowed with a maximum potency against the pathogenic organism involved. As we have seen, it is possible to isolate very powerful races of bacteriophage; other races are less active and may be very weak indeed. Any attempt at treatment with any type of bacteriophage of low potency is to court a certain defeat. The *sine qua non* of success is the utilization of bacteriophage races selected with care.

I would add a second statement, which is equally important. I have recently discovered that the therapeutic effect of a bacteriophage is the stronger the more recently the bacteriophage has been isolated. After a series of cultures in the laboratory, although *in vitro* the virulence of the bacteriophage is maintained intact, it loses more or less quickly its power of acting *in vivo*. Preliminary studies already indicate that this attenuation of *in vivo* action is due to the fact that gradually, as cultivation continues, the bacteriophage loses the faculty of adaptation. In plague, for example, the attenuation is so marked that after four or five laboratory passages the bacteriophage has lost all therapeutic action. Nevertheless, this same race, tested *in vitro*, shows no weakening in its ability to attack plague bacilli. The same facts have been noted in cholera, and are probably true also for typhoid fever. With the staphylococcus bacteriophage, on the contrary, it would seem that the therapeutic action may be maintained for a very long time through passages *in vitro*. This attenuation of action *in vivo* is caused by the passages *in vitro*,

and is not due to the period of preservation, for a bacteriophage which has undergone but two or three of these passages and is then preserved in sealed ampoules retains intact its properties for many months or even for several years.

A third observation may be made. Whatever the disease under consideration the bacteriophage must be administered in such a way that it can quickly come into contact within the body with the bacteria which it is designed to destroy. This condition can always be readily met, since one has only to select the mode of administration suited to each particular case. The question of posology is of no very great importance, since the bacteriophage commences to multiply just as soon as it comes into contact with susceptible bacteria. Theoretically, a billionth of a drop should suffice, provided the bacteriophage corpuscles are placed in contact with the bacteria which they are to destroy. *In vitro* this fact is readily demonstrated, but it is not the same *in vivo*. However, since the bacteriophage has no action upon the cells of the body, and since, as a result of this, it is possible to administer an unlimited quantity without inconvenience to the patient, even if the diagnosis is erroneous, and since it is always desirable to induce a rapid destruction of the pathogenic bacteria, it is in general wise to administer reasonably large doses. In relation to this subject I might state that as a result of laboratory experiments which have been poorly interpreted I had recommended that intramuscular or subcutaneous injections be not repeated. Subsequent experiments have shown that such a statement was not justified, and that it is often possible to administer a series of ten or fifteen large doses, that is 5 to 10 c.c.

If I may now make a final recommendation, I would say that bacteriophage destined to therapeutic usage should be prepared in accordance with a proved technique. It should not contain bacteria and it is, indeed, easy to demonstrate whether this condition is fulfilled. Suspensions of bacteriophage are perfectly clear, despite the fact that billions of bacteriophage corpuscles are present. The slightest turbidity in an ampoule indicates a certain contamination and such material should not be used.

Bacteriophage therapy is still in its infancy and many studies are still necessary before we shall demonstrate all the results that we may anticipate, but what has already been done in many diseases justifies the belief that this is the specific treatment *par excellence* and that it will attain a wider and wider application.

THE UNCERTAIN POTENCY OF LIVER EXTRACTS IN THE TREATMENT OF PERNICIOUS ANÆMIA*

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DURING the past two years it has become more and more apparent that certain preparations of liver extract used for the treatment of pernicious anæmia are inadequate to control the disease. It is not the purpose of this communication to expose any one brand of extract to the advantage of others, but rather to draw attention to certain facts which are well known to those who have facilities for making assays of the substance and for following closely a considerable number of cases treated by liver extract. It is my aim to present evidence for the consideration of those who prescribe the extract indiscriminately, and also for those who are responsible for its manufacture. One of the leading manufacturers in the United States at one time suspended its production for a considerable period, placing it again on the market only after being reasonably certain of its potency. It would seem that other manufacturing pharmacists might well follow their example.

IMPORTANCE OF EARLY RECOGNITION AND ADEQUATE TREATMENT

The consequences of failure to recognize pernicious anæmia in its incipiency and to treat it adequately are often of incalculable importance to the victim of the disease. It is now generally recognized that signs and symp-

* Read before the Osler Reporting Society, Montreal, March 27, 1931.

toms of early degeneration of the posterior or lateral columns of the spinal cord may be demonstrated in almost every case, in some even before there is any obvious anæmia. A recent patient, referred by Dr. E. E. Robbins, complained only of difficulty in controlling his legs when descending stairs. He had never been anæmic to his knowledge and his hæmoglobin was 100 per cent. More complete investigation of the blood showed that the erythrocytes were slightly reduced in number and were almost entirely macrocytes. Neurological examination demonstrated very definite early degeneration of the subacute combined type.

The recognition of early cord changes depends frequently on the demonstration of impaired vibration sense and two-point discrimination over the shins.[1] Other pathological signs in the nervous system are much less frequently present, even in fairly well advanced cases. Failure to recognize these early changes and their cause, and to treat the cause successfully, not infrequently results in total disability of the patient. A survey of the histories of the cases with advanced cord lesions attending the clinic of the Montreal General Hospital showed that they had either not been treated at all or had been using liver extract of uncertain potency. By adequate treatment the degeneration may be arrested in almost all cases, and in not a few, striking improvement may occur.

RESULTS OF TREATMENT BY (a) LIVER, AND BY (b) LIVER EXTRACT

During the past year an interesting clinical experiment has been conducted in the Hæmatological Clinic of the Montreal General Hospital. During the remission period of the disease the patients attend the clinic once a month. Some take a half pound of raw liver pulp or cooked liver daily. Others take a corresponding amount of liver extract. Only those who refuse liver for some reason are given extract. It happened, however, that roughly half of the patients were treated by liver extract and the other half by raw liver pulp or cooked liver. A third group of patients took both, so they are not included in this study. Five patients took raw liver pulp for a period, then changed to liver extract, or vice versa. In no instance was the time period less than six months. In the following tables it is possible to compare in each of the first five cases the effect of treatment by both methods. The other recorded cases were treated exclusively by one method or by the other.

It is to be noted that the cases on raw liver pulp had practically a normal blood count, while those on extract had a decided degree of anæmia. One of the most striking features, and one upon which the greatest significance is placed, is the difference in average diameter of the erythrocyte in cases treated with raw liver and in those on liver extract. The erythrocytes in the former group were on the average, of normal size, while those of the latter group were of the macrocytic type, a feature which is characteristic of all cases of the disease during an exacerbation. In other words it may be assumed that blood formation was more or less normal in the cases taking raw liver pulp, while in the others the changes characteristic of the disease had persisted. This observation would seem to be more important than the actual number of erythrocytes.

These observations may be taken as evidence that the extracts used were not so effective in controlling the disease as a corresponding quantity of liver. Why should this be so? The reticulocyte response to a potent liver extract is just as prompt and just as satisfactory as to liver. It would seem to be obvious therefore that the extracts used were not always of standard potency. The experiments which follow clearly demonstrate that this is so.

DETERMINATION OF THE POTENCY OF CERTAIN EXTRACTS

It is not a difficult matter to test the potency of liver extract if fresh cases of the disease are constantly available. This is done by a daily estimation of the reticulocytes. By means of a simple formula it is possible to calculate the expected reticulocyte increase for any given case.[2] This reticulocyte increase occurs between the fifth and the twelfth day after beginning treatment. Should a reticulocyte response not occur during this time it is proof that the extract is not potent and another

TABLE I

BLOOD VALUES OF PATIENTS ON LIVER

Name	*R.B.C. Millions*	*W.B.C.*	*Hgb. %*	*R.B.C. Diam.*	*Remarks*
J. F.	5.50	7,000	100	7.7	Raw liver pulp
T. F.	4.40	7,700	96	8.6	"
A. E.	4.34	3,700	93	7.9	"
G. M.	3.97	5,150	95	8.9	"
T. M.	5.05	8,400	94	7.8	"
M. G.	4.53	5,800	79	7.9	"
F. A.	4.48	6,450	71	8.0	"
J. G.	4.33	10,400	82	7.8	"
A. M.	4.72	5,200	90	7.4	Cooked liver
G. S.	4.04	5,900	85	8.9	"
O. T.	5.19	7,650	100	7.8	Raw liver pulp
Average	4.60	6,670	90	8.0	

BLOOD VALUES OF PATIENTS ON LIVER EXTRACT

Name	*R.B.C. Millions*	*W.B.C.*	*Hgb. %*	*R.B.C. Diam.*	*Remarks*
J. F.	3.82	5,000	82	8.1	Connaught Lab. Extract
T. F.	3.20	7,000	77	8.4	" "
A. E.	3.15	4,000	74	8.7	" "
G. M.	1.27	1,800	40	10.1	Various brands
T. M.	3.97	7,600	97	8.8	Connaught Lab. Extract
W. F.	3.80	5,150	75	8.5	" "
C. M.	2.81	4,400	70	9.0	" (Patient since dead)
E. B.	3.40	5,100	68	8.9	"
V. D.	3.60	2,900	78	8.0	"
P. E.	4.90	7,000	94	7.9	Ayerst & McKenna Brand
P. H.	3.69	9,400	73	8.9	" "
A. R.	4.03	6,350	84	8.2	Connaught Lab. Extract
Average	3.47	5,500	76	8.6	

preparation may be tried. Should a favourable response follow the exhibition of the second extract it is incontrovertible evidence that the first was useless. This feature is well illustrated in the first chart. The first and non-potent extract used in this case was a homemade one prepared by the dietitian of the hospital after the method recommended by Castle and Bowie.[3] The second extract was a potent one, as the reticulocyte rise indicates. However, the supply of this latter failed and a third was tried, with a consequent arrest of improvement in the number of red cells, which at this stage is the most significant point. Following the return to the potent extract, there was again noted a rise in the reticulocyte percentage and an increase instead of a decrease in the other blood values. The second chart is illustrative of an assay on a fourth brand of liver extract now widely used. No increase in the reticulocytes occurred until after the extract was replaced by raw liver pulp. The response to the latter treatment was prompt and complete.

EFFECT OF TREATMENT ON SUBACUTE COMBINED DEGENERATION OF THE CORD

The period of treatment has not been sufficiently long for decided opinions as to the relative value of each form of therapy in controlling subacute combined degeneration. The disease has terminated fatally in only two cases—both treated by liver extract. One case is not included in the series because it is perhaps unfair to write it down as a failure of liver extract. The man entered the hospital because of profound anæmia and vomiting. The physical examination revealed all the features of pernicious anæmia. He was at once transfused, in the hope of temporarily raising the erythrocyte level and stopping the vomiting so that liver extract would be retained. This procedure was, however, unsuccessful. Finally, a successful attempt was made to introduce a single massive dose of extract by means of the duodenal tube. He retained an amount of extract (Connaught Laboratory product), equivalent to seven pounds of liver. It has already been demonstrated that such a

massive dose will bring about the same reticulocyte response as if the extract were given in the usual amount over a period of days.[4] The reticulocyte count was done daily thereafter, but the expected rise did not occur and the patient died on the eighth day after the introduction of the extract. Necropsy showed no cause for death other than the anæmia. In such a case one cannot but feel that the extract was not what it should have been, although in this instance direct proof is lacking.

The second case, which terminated fatally, had previously shown a good response to cooked liver. After several years of liver therapy she changed to extract in spite of medical advice, and an exacerbation of the disease occurred which terminated fatally.

IMPROVEMENT IN CORD CHANGES

There is considerable debate at present as to the effect of liver and liver extract on the spinal cord changes in the disease. A survey of recent literature reveals many reported cases in which cord changes have advanced under treatment. The records of the Montreal General Hospital afford ample evidence of a similar nature, but many of these cases have not been followed from month to month and accurate data kept as to the faithfulness of the patient to the treatment. In the group of cases used as a basis for this paper the patients were under constant supervision. Not one of the cases treated by means of raw liver pulp has shown any marked progress of the cord lesions, while few of the extract-treated cases are now able to equal their records on vibration sense and two-point discrimination made a year ago. Many of the cases treated with raw liver show definite improvement over the tests done a year ago, and in a few the improvement has been striking. One case was referred to the hospital with a diagnosis of tabes because of a positive Wassermann and loss of the use of his legs. He left the hospital on May 24th last in a wheel chair. He returned in July on crutches. The blood values had greatly improved and the Wassermann reaction was now negative. In October he returned, using only a cane and with the story that he was walking to work and playing nine holes of golf. In January, 1931, the blood values were almost normal and he had discarded his cane. Examination at this time still showed a loss of tendon reflexes, slight Rombergism, and a bilateral Babinski sign.

CHART I

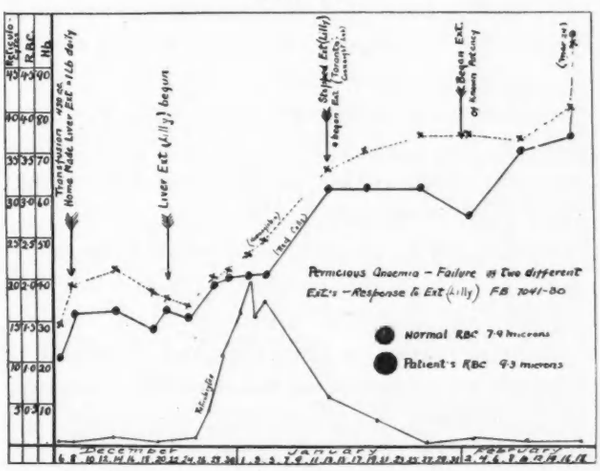
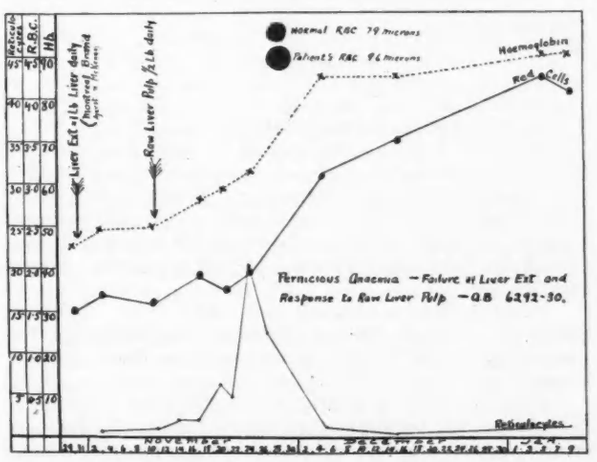


CHART II



No other case in our series has shown comparable improvement though two have been able to discard crutches for a stick. One naturally speculates as to the nature of the damage to the spinal cord in such cases. It certainly cannot be a sclerosis or such rapid improvement would be impossible. The improvement may be akin to that in tabes where reeducation of muscles innervated through other nerve pathways is said to play the important rôle, or the lesion may be simply degeneration without total destruction.

CONCLUSION

The obvious conclusion to be drawn from a study of this series of cases is that raw liver pulp is superior to liver extract in the treat-

ment of pernicious anæmia, and this is especially true where there is doubt as to the potency of the extract used, as with some brands now in common use in Canada.

REFERENCES

1. MILLS, *Canad. M. Ass. J.*, 1928, 19: 546.
2. MINOT, COHN, MURPHY AND LAWSON, *Am. J. M. Sc.*, 1928, 175: 599.
3. CASTLE AND BOWIE, *J. Am. M. Ass.*, 1929, 92: 1830.
4. RIDDLE AND STURGIS, *Am. J. M. Sc.*, 1930, 180: 1.

LIVER DAMAGE FOLLOWING CINCOPHEN PREPARATIONS*

WITH A REPORT OF FIVE CASES

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THIS report comprises five cases of liver damage, three of which progressed to a fatal termination. All occurred after the use of cincophen preparations.

The etiology of acute and subacute liver atrophy (so-called "yellow atrophy") and, indeed, of most forms of hepatitis, is complex and cannot be attributed to a single factor. The origin is undoubtedly obscure. There has been, however, a recently growing interest and anxiety in regard to cincophen as a cause of liver disorders, acute, subacute and chronic. Two recent papers have brought the matter to the notice of the medical profession. Rabinowitz,[1] reviews the literature and finds 50 cases, including the 7 which he himself contributes. Twenty-five of these ended fatally; all showed various degrees of 'yellow atrophy"; and all had had cincophen derivatives in varying dosage prior to the development of the hepatitis. Parsons and Harding[2] report 4 more cases. These writers review the literature from 1923 when the first case was recorded by Worster-Drought,[3] one of hepatitis and jaundice following the use of atophan. "New and Non-Official Remedies" has added to its paragraph on cincophen derivatives in the 1930 edition[4] a new clause referring to the danger of acute yellow atrophy. I refer to the above papers to point out how recently suspicion has been directed toward these drugs, which have been in clinical use since 1908. In all the reported cases there have been varying degrees of hepatitis, some showing mild, subacute, transient jaundice, with recovery apparently of integrity of liver function, others progressing rapidly along the course of "acute yellow atrophy" to death. There are all grades of clinical pictures between these two extremes. The liver damage seems not to depend upon dosage nor length of treatment, some persons showing severe hepatitis after taking amounts which others can exceed with impunity. The question has arisen as to whether the liver can become sensitized to cincophen so that it is demolished by comparatively small doses. All the autopsies have shown a picture of small shrunken liver with extensive cytolysis, in no way to be distinguished from the "yellow atrophy" liver of pregnancy, arsenic poisoning, or of obscure etiology.

In the light of these papers, we have, in retrospect and by careful inquiry into the histories of cases of hepatitis which have since come under observation in the wards and pathological department of the Montreal General Hospital, been impressed by the 5 cases which are now reported. In none was any other cause for the hepatitis discoverable, and in all cincophen administration preceded the development of jaundice.

CASE 1

Female, aged 42, married.

Family history.—Irrelevant.

Personal history.—Measles at 21, followed by otitis and some permanent deafness; frequent "head colds," pneumonia 8 years ago. Occasional palpitation on exertion. Two children alive and well. Two miscarriages between the births of these children. No toxæmia during pregnancy. Urination normal. Digestion normal. Slight constipation.

Present illness.—During June and July, 1930, the patient had been taking Tolysin intermittently for general joint and muscle pains, but the dose was not known.

July 1, 1930, an attack of "indigestion" lasting a few days; no pain or vomiting. August 1, 1930, a severe digestive upset; epigastric pain; vomiting; tem-

* Read before the Montreal Medico-Chirurgical Society, February 14, 1931.

From the Departments of Medicine and Pathology, the Montreal General Hospital.

perature, 100°. Two days later she became jaundiced. She felt well after the first week although the jaundice persisted, and she seemed to be following the course of an ordinary catarrhal jaundice, except that about once in every week she would vomit. She had no pain. The appetite was good.

On September 3, 1930, she began to vomit everything taken by mouth. The appetite was still good. Examination at this time showed deep jaundice, but no other abnormality except the presence of bile, albumin, and a great many large fragmented casts in the urine. No leucine or tyrosine crystals were found. Liver dullness was normal. No tenderness or palpable organs. Blood count normal. Urobilinogen, normal 1/10. Stool normal. Vomiting continued intermittently for one month with no change in the jaundice.

On October 8, 1930, the patient was admitted for hospital investigation and in three days died with a sudden typical course of acute yellow atrophy,—shrinking of the liver dullness to almost nil; fall of blood-urea-nitrogen to 4 and finally to 3 mg. per cent; delirium, coma; petechial hæmorrhages; and free fluid in the peritoneal cavity.

Autopsy.—"All tissues bile-stained. Free fluid in left pleural cavity; dense adhesions in right. Bright red hæmorrhagic spots under pleura. Lungs are otherwise normal. Heart muscle rather pale and flabby. Peritoneal cavity filled with clear fluid. Slight swelling of mesenteric lymph nodes. Spleen soft and hæmorrhagic. Ecchymotic areas beneath stomach mucosa. Fæces not clay-coloured. Liver weight 670 g., tiny, wrinkled, of soft, flaccid rubbery consistency. The left lobe more affected than the right. Through the left lobe, and to a less extent in the right, are large areas of red firm tissue in which microscopic section shows that the liver parenchyma has been almost completely destroyed. Sharply marked off from this tissue are nodular yellow areas most numerous in the right lobe. These are raised above the surface and section shows them to consist of liver parenchymatous tissue, the cells showing extensive fatty degeneration and some evidence of attempt at regeneration by hyperplasia and early fibrosis. The bile passages are patent. The kidneys show an acute degenerative process with marked cloudy swelling. The whole picture is that typical of acute yellow atrophy of the liver."

CASE 2*

Female, aged 58, married.

Family history.—Irrelevant.

Personal history.—No miscarriages. No toxæmias of pregnancy. No typhoid. Menopause complete at 46. Two years ago she began to suffer attacks of epigastric pain radiating to both shoulders. These attacks lasted one to two weeks and were followed by tenderness over the gall-bladder region. Between attacks there were gaseous eructations and epigastric distress not relieved by food. For pain in the shoulders took quinophen (Burroughs Wellcome Co.), gr. 10 to 15 daily for several weeks. Fifty grains were dispensed to her on April 29, 1930, for use as required and she returned to receive an additional 50 grains on May 25, 1930.

Present illness.—About June 15, 1930, two months prior to admission, she had a severe attack of pain and vomiting with jaundice and clay-coloured stools. Since that time the jaundice had persisted and deepened with clay-coloured stools almost all that time. Occasionally there would be a yellow stool. The urine was deeply pigmented. One month prior to admission another severe attack of pain occurred. She was admitted on August 12, 1930.

Examination.—Temperature, 99°; pulse, 100; blood pressure, 164/64. Harsh systolic murmur over precordium. There was abdominal tenderness, most marked over the gall-bladder, where there was a firm rounded mass about 6 cm. in diameter; also some tenderness in both lower quadrants and to the left of the umbilicus. The urine was normal except for the presence of bile. White blood cells, 12,800. Clotting time 4 minutes. Blood-urea-nitrogen 15; creatinine, 1.25; blood sugar, 0.120. The sugar time curve showed markedly diminished tolerance. Diagnosis.—Cholelithiasis with obstructive jaundice.

Operation August 15, 1930. The gall bladder contained several stones which were removed and the common duct drained. It appeared to be patent. The liver was noted as being small, showing some wrinkling of the capsule resembling cirrhosis, with a few red patches. The patient's condition was good on return to the ward, but six hours later the pulse began to fail and in spite of intravenous glucose injections, caffeine and strychnine, the heart action became irregular and death occurred in coma 12 hours after operation.

Autopsy.—A very deep bile staining of all tissues. There was some blood in the pelvis but no evidence of peritonitis. Some bleeding into the stomach and small bowel. The spleen was soft, hæmorrhagic, and so friable as to appear almost necrotic. The pancreas showed marked degeneration. The liver weighed 750 gm.; left lobe only 1 cm. in thickness. The whole organ was shrunken and flabby. Its surface was of a mottled yellow colour, with areas of flat reddish brown tissue between the more elevated yellowish patches. Grossly, the liver parenchyma was almost completely destroyed. There was no obstruction of the bile passages. Microscopically, there was an apparent increase in the stroma and bile ducts. Hæmorrhagic infiltration was seen throughout the organ. The structure of the individual lobule was destroyed and masses of liver cells showing extreme grades of cytolytic necrosis were grouped irregularly. Beneath the capsule were small areas of fibrosis and duct regeneration. Pathological diagnosis: acute diffuse necrosis of the liver (acute yellow atrophy) superimposed upon a subacute condition. The kidneys, pancreas and adrenals also showed acute degenerative lesions.

CASE 3*

Male, aged 41.

Family and personal history.—Irrelevant.

Present illness.—For two years he has had pain and stiffness in the right hip, gradually increasing, and for six months prior to admission preventing him from working. He was seen by Dr. H. R. Clouston, who diagnosed tuberculosis of the right hip with flexion and adduction deformity. For two years he had taken intermittently to relieve his pains, tolysin and cincophen (Shuttleworth). In December, 1929, he became acutely ill with an exacerbation of his arthritis and during the following month took cincophen gr. 7½ three or four times daily. After that he returned to the occasional use of cincophen.

April 9, 1930. He was admitted to the Montreal General Hospital for an ankylosing operation on the right hip joint. Examination was negative except for the hip condition and the presence of an occasional granular cast in the urine. Heart and blood pressure were normal. Nutrition and general condition were good. There was no jaundice. The abdomen was normal.

April 12, 1930. Operation under intratracheal ether. It was well borne until the close when the pulse failed and his condition became poor. Intravenous glucose-saline was given but he began to vomit everything taken by mouth and the next day the vomitus contained blood. A large number of granular

* Contributed for publication by Drs. C. L. Roman and R. R. FitzGerald.

* Contributed for publication by Drs. H. R. Clouston and J. A. Nutter.

and hyaline casts appeared in the urine. It was noted that the liver dullness was markedly diminished. There was no jaundice. Failure was progressive and the patient died 48 hours after operation.

Autopsy.—The operative field was clean and satisfactory. The lungs showed passive congestion. The spleen was soft and hæmorrhagic. The liver was atrophic, weighing 1220 grm., pale, pasty brown in colour and very soft. Sections showed degeneration and loss of the liver cells about the central veins and fatty degeneration of the liver cells elsewhere. There was an acute degenerative lesion of the kidneys. The heart and vessels showed no abnormality.

The second and third cases illustrate Rabinowitz's contention that an anæsthetic, operative shock, periods of starvation, or any such circumstance which depletes the liver glycogen stores, may precipitate an acute cytolytic collapse of the cincophen-poisoned liver.

CASE 4

Male, aged 26, previously healthy and active.

Family and personal history.—Nothing to suggest diabetes or liver dysfunction. During February and March, 1930, he had some general joint and muscle pains, for which he took neo-cincophen rather irregularly over a period of two weeks, probably not more than 120 gr. in all. During the next three weeks he began to lose weight and his friends remarked a definite icteroid tinge. The total loss of weight was some 15 lb. At this time it was discovered that his liver was palpable and definitely tender. Malaise was marked. About one month later he developed polyuria and glycosuria. The blood sugar was 0.129 per cent and his sugar tolerance, as judged by the sugar time curve, was markedly impaired. This was considered an hepato-pancreatic upset associated with the hepatitis, not a true diabetes. The icterus persisted through the summer, gradually subsiding in September, and since that time the weight has returned to normal. The blood sugar in October was 0.128 per cent. This man now feels well and the urine is sugar-free. He has no digestive disturbance, but the liver edge is still just palpable and definitely tender eleven months after the onset.

CASE 5*

Male, aged 68.

Family and personal history—Irrelevant.

Present illness.—He was admitted to the Montreal General Hospital on December 31, 1929, as a mild case of rheumatoid arthritis with a history of gradual onset over a period of three months previously. The symptoms were never very severe. He came to hospital for investigation and during this time was given bakings, low protein diet and massage. On January 3, 1930, atophan, gr. 7½, three times daily, was begun. A total dosage of 855 grains was given until February 8, 1930, when there was a slight digestive disturbance and the patient vomited. The next day he was definitely, though not deeply, jaundiced. The atophan was discontinued. There was no further vomiting, the liver did not become enlarged nor tender, and the stool was always coloured. There was no evidence of gall-bladder disease. The general examination, except for the joint condition, was negative. The jaundice persisted and was still present, though very slight, when the patient left hospital on February 14, 1930.

We consider cases 4 and 5 as examples of subacute hepatitis, one of prolonged duration, which might well under the influence of an operation or some acute concurrent infection have been diverted into acute hepatolysis instead of presenting a course toward recovery.

* Contributed for publication by Dr. A. H. Gordon.

COMMENT

These five cases, then, all show a similar type of lesion, though varying widely in severity and course. All have the common factor of therapy with some cincophen derivative prior to the onset of hepatitis. It may be a *post hoc propter hoc* method of reasoning to place the blame upon these drugs, and I am not presenting these cases as being free from loop-holes for the sceptic. I think, however, that the "coincidence" is becoming too frequent to be ignored. Many authors[5, 6, 7] have commented upon the increasing frequency of acute and subacute yellow atrophy as well as all forms of hepatitis during the past decade. That this may be connected with the increasing use of cincophen products is a very recent conception.[8, 9] There are a great many of these products now on the market, having cincophen as their basis, both quack rheumatism "cures" and reputable analgesics and gall-bladder dye preparations. The list as given by Rabinowitz includes:—phenyl-cinchoninic acid, atophan, novatophan, atophanyl, diiodoatophan, biloptin, oxyliodide, quinophen, agotan, neo-cincophen, quenophan, leucotropin, atophan-urotropin, fantan, iriphan, tolysin, weldona, farastan and atoquinol. All of these contain the quinolin nucleus which splits to liberate pyridine and the toxic ring of free benzene which is the product held responsible for the effects on the liver.[10] I do not wish to indict any particular preparation. I present these five cases as additions to the growing number of serious and fatal liver disturbances following cincophen therapy, and suggest that as physicians we should go very carefully into the histories of such cases and report them promptly, in order that this in many ways very valuable group of analgesic agents may be quickly condemned or exonerated.

I wish to thank Dr. L. J. Rhea, Pathologist, and the members of the Attending Staff of the Montreal General Hospital for their assistance in compiling these cases.

REFERENCES

1. RABINOWITZ, *J. Am. M. Ass.*, 1930, **95**: 1228.
2. PARSONS AND HARDING, *Am. J. M. Sc.*, 1931, **181**: 115.
3. WORSTER-DROUGHT, *Brit. M. J.*, 1923, **1**: 148.
4. New and Non-Official Remedies, Am. M. Ass., 1930.
5. HOWARD, *Canad. M. Ass. J.*, 1927, **17**: 996.
6. LEPEHNE, *Deut. med. Wochnschr.*, 1921, **47**: 800; *ibid.*, *Münch. med. Wchnschr.*, 1928, **75**: 2214.
7. UMBER, *Klin. Wchnschr.*, 1922, **1**: 1585.
8. REZENDE, *Brazil med.*, 1927, **39**: 1005.
9. MOUZON, *Presse méd.*, 1928, **79**: 1256.
10. WILLCOX, *Brit. M. J.*, 1926, **2**: 273.

EFFECTS OF HYPERTONIC SALINE IN THE TOXÆMIAS OF LATER PREGNANCY*

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FOUR years ago the authors, in a paper entitled "Diet in the treatment of pre-eclampsia," advocated the use of salt-free diet.[1] Such diets contained about 3 grams of chloride, reckoned as sodium chloride, and are more usually nowadays, and more legitimately, called salt-poor. At the time the authors were particularly concerned in making clear that diets high in protein or in fat were quite innocuous to pre-eclamptics. As a practical corollary it followed that ordinary mixed diets of protein, carbohydrate, and fat could be utilized, provided they were salt-free or salt-poor. Not only were such diets innocuous to the pathological condition, but the patients showed marked clinical improvement. In view of the number of factors concerned, however, we did not consider it legitimate to ascribe the improvement to the protein or fat in the diet. Rest in bed and general attention to hygiene are such powerful factors in general clinical improvement that it required much stronger evidence than we possessed to conclude that high protein feeding or high fat feeding was beneficial.

We were also interested in the effect of our observations upon theories of etiology. Protein *per se*—if our observations were correct—could not play a part in the production of eclampsia. Those authors who had ascribed the reduction in the incidence of eclampsia in Germany[2] during the war to a reduction of dietary protein could not, in our opinion, have been correct. That a dietary factor exists appears certain. That the dietary factor is protein, or even fat, is uncertain, despite the popularity of the former supposition. We may state in further support of our contention that since our previous publication we have given high protein diets, not to pre-eclamptics, in whom there might be a doubt that actual convulsions would occur, but to eclamptics, who, having responded to treatment with sedatives, were admitted to the ward for further observations. We noticed no aggravation of symptoms; indeed, as previously, we found an improvement.

The use of salt-free or salt-poor diets in the treatment of nephritis of the parenchymatous type is well known. The influence of sodium chloride and of sodium bicarbonate in definitely aggravating the symptoms of albuminuria and œdema in that condition is a matter of well-known clinical and laboratory demonstration. The observations of our previous paper may have been open to the criticism that we were dealing with patients in whom the kidney lesions were of the parenchymatous type. De Wesselow[3] has emphasized the occurrence of this type in the toxæmias of pregnancy.

Since then, however, we have been able to reinforce our conclusions on the part played by sodium chloride by a series of further observations—namely, by the use of sodium chloride intravenously. The use of hypertonic saline solutions has become very general in some centres for the treatment of post-operative paralytic ileus, either actual or threatened. It is also a powerful dehydrating agent and diuretic. In the treatment of eclampsia or threatened eclampsia one notices, too, a tendency towards the use of intravenously administered dehydrating agents. Lazard[4] has enthusiastically advocated the use of intravenous magnesium sulphate. Titus[5] uses 50 per cent glucose solution, though with a confessedly different object. Mussey[6] recommends ammonium chloride by the mouth. A brief review of many of the older methods of treatment shows that some of the therapeutic agents removed water—for example, purging, venesection, hot packs. These were used frequently and often with success. Their object was to remove toxin, but at the same time they removed body fluid. Thus the use of hypertonic saline solutions might prove beneficial. True it might produce or aggravate œdema in a case complicated by parenchymatous nephritis, but the symptom of subcutaneous œdema has never been considered as *the* dangerous one in an eclamptic

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A paper read in opening a discussion in the Section of Obstetrics at the combined meeting of the British and Canadian Medical Associations, Winnipeg, Aug. 28th, 1930.

or pre-eclamptic patient. To relieve the symptoms of convulsions and high blood pressure, with its attendant dangers of hæmorrhage, would be well worth the cost of a little œdema.

These latter arguments, valid as they may sound, are fallacious. The use of hypertonic saline solutions in toxæmias of later pregnancy is harmful. We present four cases, one normal, acting as a control, the other three being varying degrees of toxæmias, though we feel some doubt as to the diagnosis in Case II.

CASE I.—*Normal Pregnancy. 0-Para. 8 months pregnant. Aged 19.*

Date	*Blood Pressure (mm.).*	*Urine Albumin (mg. per 100 c.cm.)*	*Notes*
1929			
June 6	128/64	0	Full diet
" 7			"
" 8	120/58	0	"
" 9			
" 10	124/68	0	300 c.cm. of 10% saline intravenous
" 11	124/53	0	" " "
" 12	110/50	0	Full diet

The patient had been observed carefully in the clinic, and was normal. The intravenous saline was given on June 10th at 2 p.m. after the noon meal. She complained of thirst, and was given chipped ice; she took an ordinary supper. On June 11th the intravenous saline was given at 11 a.m., and the patient fed on orange juice the remainder of the day. Later in the day two fluid bowel movements occurred, but otherwise no effects were observed.

CASE II.—*Possibly Mild Toxæmia. 4-Para. 8½ months pregnant Aged 22.*

Date	*Blood Pressure (mm.).*	*Urine Albumin (mg. per 100 c.cm.)*	*Notes*
1929			
March 15	156/92	50	Few pus cells in urine. Full diet. Pot. cit. 30 grains. Sod. bicarb. 30 grains. Two-hourly.
" 16	138/98	20	
" 17	128/90	20	
" 18	134/90	30	300 c.cm. 10% saline intravenous.
" 19	118/90	10	Complains of nausea. Milk diet
" 20	118/84	10	Headache. Milk diet.
" 21	118/84	20	Well. Milk diet.

The patient was admitted from the outdoor clinic as suffering from mild toxæmia. She had slight puffiness in the ankles and face, and a blood pressure of 150 mm. A trace of albumin was found. She improved at once with rest in bed. The intravenous saline, given at 2 p.m., caused excessive thirst, and the patient complained of weakness. Chipped ice was given to allay the thirst. Nausea and headache were complained of on the two following days. There was no œdema. A successful medical induction was carried out the following week.

CASE III.—*Mild Toxæmia. 1-Para. 8½ months pregnant. Aged 21.*

Date	*Blood Pressure (mm.).*	*Urine Albumin (mg. per 100 c.cm.)*	*Notes*
1929			
Feb. 26	140/96	200	Full diet.
" 27	120/96	190	300 c.cm. 10% saline intravenous 2 p.m. Milk diet. Vomiting.
" 28	134/90	250	Backache.
March 1	150/110	450	Backache. Vomiting.
" 2	138/80	..	Labour.

The patient was admitted from the pre-natal clinic on account of irregular gain in weight, slight increases in blood pressure, and sudden albuminuria. A still-birth had followed a previous pregnancy. The patient felt perfectly well; there were no headaches nor œdema. When the intravenous saline had been given the increase in albuminuria was marked. The blood pressure, both systolic and diastolic, on March 1st was the highest recorded over a long series of observations. Labour was prolonged, lasting three days. The baby was normal. On March 6th the blood pressure was 130/90, and the albuminuria was 100 mg. per 100 c.cm.

CASE IV.—*0-Para. 8 months pregnant. Aged 17*

Date	*Blood Pressure (mm.).*	*Urine Albumin (mg. per 100 c.cm.)*	*Notes*
1929			
Nov. 16	190/130	..	Admitted one convulsion. No œdema. Stroganoff treatment.
" 17		900	Improved. Milk diet.
" 18	140/112		Salt-free mixed diet.
" 19	130/100	600	Feeling well.
" 20	150/110		
" 21	148/114		
" 22	134/104	500	
" 23	122/90	400	
" 24	120/98	350	
" 25	115/84	200	
" 26 a.m.	128/100	250	300 c.cm. 6% saline intravenous 9 a.m.
p.m.	135/115	375	
" 27 a.m.	130/115		300 c.cm. 10% saline intravenous 10 a.m.
noon	178/158		Headache. Epigastric pain. Vomited.
3 p.m.	160/120		Vomited. Face congested. No œdema.
6 p.m.	180/118		Seems a little improved.
9 p.m.	200/140		Convulsions. Stroganoff treatment. Strong uterine contractions. Labour 11 p.m.
" 28	130/98	800	Water only.
" 29	140/100		Milk diet.
" 30	130/98		"
Dec. 1	130/100	200	Feeling well.

The effect of the intravenous saline solution on the blood pressure, albuminuria, and general symptoms was very clear. A colon irrigation preceding the labour was followed by a veritable deluge of fluid. The labour was very precipitate. The fetus was small and ill developed.

Two well-defined criteria for estimating the extent of a toxæmia of later pregnancy are blood pressure and albuminuria. Judged by these standards, our observations divide themselves into two groups. The first, consisting of Cases I and II—where Case I is normal and Case II is a doubtful toxæmia—show no effect at all. Both patients had thirst, as would be expected in any normal individual. In Case I there were two fluid bowel movements, and the patient in Case II complained of nausea and headache on the two days following the injection. The elimination of salt and water by the bowel was in all probability the reason for the two fluid stools in Case I. The nausea and slight retching in Case II may be a variation of the same method of elimination which failed to relieve itself by the emptying of the bowels. The headache followed the intravenous saline and lasted two days. Judged by the major criteria of albuminuria and blood pressure, however, both cases showed no effect—indeed, Case II showed an obvious drop in pressure, despite the disturbance caused by the nausea and the headache.

Judged by the same two criteria Cases III and IV form another group. In both the albuminuria increased. In Case III the concentration of 450 mg. per 100 c.cm. urine was the highest noted throughout the whole period of observation. One of us had made fortnightly weighings and blood pressure and urinary examinations of this patient for a previous three months. Albuminuria and a slight elevation of blood pressure had been observed a fortnight previous, and on their continuation the patient was brought into hospital. Just as a peak in the albuminuria was noticed after the intravenous saline had been given, so a peak in the blood pressure level was observed, both systolic and diastolic. It is to be noticed that vomiting was present in this case also, and persisted for two days. It is hard to escape the conclusion that the hypertonic saline had aggravated the toxæmia. In Case IV the conclusion is irresistible. The changes follow one another with such dramatic suddenness that we have no difficulty in distinguishing cause and effect. On admission she had high blood pressure, marked albuminuria, and one convulsion. These, together with the absence of any history of nephritis, her age, and primiparity, make a clear diagnosis of eclampsia. The convulsive stage was easily checked by sedatives. Rest in bed and a salt-free mixed diet rapidly reduced the albuminuria and blood pressure. The effect of 48 grams of sodium chloride, given in two doses on the mornings of November 26th and 27th, immediately changed the whole picture. The changes were possibly evident on the evening of the first day, when the blood pressure and albuminuria increased over those of the three previous days. The changes at the end of the second day represented a return to the symptoms of eclampsia. The blood pressure reached 200/140. Headache, epigastric pain, and vomiting were present. There was a typical appearance in the facies of congestion and coarseness, but no definite puffiness or pitting on pressure was observable in any part of the body. By 9.30 p.m. three convulsions had occurred. Sedatives were administered at once, but the patient went into precipitate labour, and delivered a living child within an hour. The albuminuria also had more than doubled in intensity.

From the standpoint of practical therapy the results are wellnigh disastrous. We have, at present, no wish to continue our observations in this direction. In our very incomplete state of knowledge it appears fraught with too much danger to the patient, though the very acuteness of the disturbance brought about by an external agency possibly offers safeguards of its own, of which we are only dimly aware. We refer to the onset of labour. In both of the latter cases labour supervened shortly after the disturbance initiated by the saline solution. In both cases a living child was obtained. With birth, as is often the case in rapidly developing eclampsia, there was a rapid subsidence of symptoms and a return to a normal condition. There is, however, a definite negative value to our observations, namely, the contraindication of hypertonic saline solutions in post-operative work in pregnancy where there is any indication of toxæmia, unless the pregnancy is to be terminated simultaneously.

The observations recorded in this paper extend and reinforce those of our previous work on this subject. The commonly occurring dietetic factor which can enter into the production of eclampsia or pre-eclampsia is sodium chloride. Other observers have emphasized the value of restriction of salt in the treatment of such toxæmias from the standpoint of kidney insufficiency. Eckelt[7] in Germany, de Wesselow and Wyatt[8] in England, Bland and Bernstein[9] in America, have advocated salt restriction from this standpoint. Stander[10] in his recent monograph recommends a salt-free diet if there is marked œdema. In our previous paper we were inclined to think that salt could

play a part in the more fundamental changes connected with the toxæmia, and suggested a possible value in salt restriction from the standpoint of pre-natal care. The observations recorded in this paper lead us to the conclusion that a high intake of salt, taken at the right moment, in a developing toxæmia will produce an albuminuria, an increased blood pressure, and convulsions, in a short period of time. Such a picture represents a fulminating eclampsia. One hears often of cases in which a patient, under good pre-natal care and with a normal blood pressure and urine, develops convulsions within a week or a fortnight; or where a patient, with a mild toxæmia, and under observation, develops convulsions within twenty-four or forty-eight hours of an office visit, when no immediate danger was suspected. If such a patient has had in the meantime a generous meal in which meat is prominent, the protein is promptly blamed. We would suggest a strict inquiry into the amount of salt taken with the protein and the usual accessories of a generous meal. Salt restriction, in our minds, is a necessary part of pre-natal care. Protein is harmless. Bland and Bernstein claimed a diminution in blood pressure when their toxæmia patients were placed on salt-free diet. This followed a three-day period of ordinary hospital diet in which no diminution in blood pressure was observed. Three days after admission to hospital is a short time in which to observe a fall in blood pressure in a case of toxæmia, even if it is accompanied by rest in bed. A week or ten days is not too short in many cases. Bland and Bernstein appear to realize the weakness of their position, for they endeavour to make the observations more equable by allowing the patients the liberty of the ward during the salt-free diet period. It is unfortunate that they did not reverse the order of their diets in half their observations.

In our previous paper we noted observations on the effect of sodium bicarbonate in a toxæmia of pregnancy. There was a recurrence of the œdema which had subsided on the salt-free diet, and a distinct rise in blood pressure both systolic and diastolic. At the time we did not wish to associate the rise in blood pressure with the sodium bicarbonate. We were more inclined to ascribe it to the nervousness of the patient herself, who had observed and knew the significance of the return of the œdema. In the light of our new observations the rise in blood pressure, following sodium bicarbonate administration in toxæmia of pregnancy, may be as justly ascribed to the retention of the sodium salt as it is after the intravenously administered sodium chloride, though it is to the sodium ion, rather than the chloride or bicarbonate ion, that we attach importance.

Our observations, too, have a bearing on the general question of a relationship between chloride retention and hypertension as claimed by Ambard and his school. On this continent Allen[11] championed the beneficial effect of extreme chloride retention on essential hypertension. His first observations were not substantiated by all later workers,[12] and Allen[13] himself later realized that all classes of hypertension were not benefited by the restriction. The high blood pressure of the toxæmias of pregnancy, where functional rather than morphological changes are involved, would seem a much more promising condition in which to show the effects of a salt restriction.

From the standpoint of etiology we believe our results to be of value. It is impossible in the present state of our knowledge to separate the influence of sodium salts and water from either a physiological or a pathological point of view. Our observations in this and in the previous paper have shown a connection between sodium chloride and convulsions, albuminuria, high blood pressure, œdema, epigastric pain, and vomiting in the toxæmic subject. All these are, or can be, symptomatic of eclampsia or pre-eclampsia. We cannot but fail to conclude that underlying a variety of symptoms lies a unity of disturbance—a water retention, or a change in its distribution in the body. Zangemeister[14] has stressed the importance of observing the gains in weight during pregnancy and of suspecting any abnormally high gain as a sign of impending toxæmia. Ginglinger[15] judges his toxæmia cases by the Cl retention, the daily weight of the patient, and a measurement of the water intake and output. Holtermann[16] tests for latent œdema in pregnancy by Kaufmann's modification of Frey's diuresis test. Siderow,[17] using Galeotti's method of measuring insensible perspiration, finds a very low output in toxæmias.

Our conception of the toxæmias of later pregnancy is a disturbance involving fundamentally a change in water distribution. This may be preceded or accompanied by a water retention showing itself in an abnormal gain in weight (Zangemeister). Once initiated, however, the disturbance may show itself in many ways: (*a*) epigastric pain and vomiting—the significance of

an attack of "acute indigestion" as symptomatic of a toxæmia when occurring in later pregnancy has often been emphasized; (*b*) albuminuria—with a kidney lesion of the parenchymatous type or mixed; (*c*) hypertension—often present as the sole symptom, or accompanied by a slight albuminuria, in pregnancy of middle-aged multiparæ; (*d*) œdema—one of the commonest of symptoms; (*e*) convulsions—occurring by themselves these resemble epileptic seizures, and can only be distinguished by the fact of pregnancy and the absence of any previous history of epilepsy; (*f*) perilobular liver degeneration—not always present.[18] One, or many, or any combination of these symptoms may accompany the water disturbance. Herrick[19] has pointed out how the constitution or the make-up (possibly endocrine) of the mother determines the course of the toxæmia as it shows itself in successive pregnancies. In our opinion it is this maternal constitution which determines the appearance of one or any combination of symptoms.

We have referred to changes in water distribution as well as to water retention. An interesting case illustrating a relationship between œdema and high blood pressure, has been referred to us by our colleague Dr. W. G. Cosbie, who has kindly allowed us to make use of his notes. The patient had been under his care and routine observation from the beginning of her pregnancy and had been perfectly well until February 19th, when she complained of a severe headache. The essential symptoms and observations are best given in chart form.

CASE V.—*0-Para. 5 months pregnant. Aged 31.*

Date	*Blood Pressure (mm.).*	*Urine Albumin*	*Œdema*	*Notes*
1929				
Feb. 14	136	0	0	Well.
" 19	150	0	++	Severe headache. Œdema in face and feet. Bed with salt-free diet.
" 20	170	+	+	Milk diet only. Œdema less. No headache.
" 21	190	++	0	Severe occipital and frontal headache. No œdema. One hour after record of B.P. two convulsions. Modified Stroganoff treatment.
" 22	142	+++	++++	General anasarca.
" 23	160		++	Œdema disappearing. Hot pack.
" 24	140	+	+++	Œdema returning.
" 25	160	++	+	Œdema disappearing.
" 27	170	+++	+	Œdema very slight.
" 27	196	++++	0	No œdema. Uterus emptied.

The sudden onset of symptoms was marked by a moderate rise in blood pressure, with a moderate œdema. In two days, in spite of a salt-poor diet and a milk diet, the blood pressure mounted to the convulsive level, with a disappearance of the œdema. In twenty-four hours the blood pressure had fallen and given place to a massive general œdema. The treatment on February 21st included magnesium sulphate to ensure brisk elimination by the bowel. It seems reasonable to suppose that the water in the œdema had come from the cells, since little or none had been given by the mouth, and that the water in the cells had been responsible for the high blood pressure. An opposite state of affairs would appear to have taken place between February 24th and 27th. The œdema subsided and the blood pressure rose. Apprehensive of further convulsions, the uterus was emptied on February 27th. The increase in the albuminuria during the same period is also significant.

Allusions are to be found in the literature to the similarity of the convulsions of eclampsia to those produced in animals by the continuous forced administration of water. Rowntree and his co-workers[20] discovered and investigated this latter phenomenon and termed it "water-intoxication." It is characterized by a positive water balance, but this is correlated with an alteration in the sodium or base balance which results in a lowered amount of sodium in the plasma. Recovery from "water intoxication" convulsions in animals is very rapid by the use of intravenously or intraperitoneally administered hypertonic sodium chloride solution. The observations in this paper show a complete contrast in the action of hypertonic saline on eclampsia compared with "water intoxication" in animals. Moreover, Stander, Eastman, Harrison and Caddan[21] have shown an increased amount of base in the plasma of eclamptics. This again is in contrast with the findings in "water intoxication" in animals. It would appear that, despite a similarity of the convulsive states in the two conditions, and that changes in the water balance are probably involved in both, a clear distinction must be made. McQuarrie,[22] in his recent studies on epilepsy, has drawn attention to its similarity with eclampsia, as well as "water intoxication." According to the author the use of urea among other measures acts as a preventive against the seizures of epilepsy. Harding and Harris[23] have recently investigated the influence of urea solutions in "water intoxication" with negative results, and are thus inclined to dissociate it from epilepsy. Whether urea will be of value in the treatment of eclampsia and pre-eclampsia remains to be seen.

REFERENCES

1. HARDING AND VAN WYCK, *J. Obst. & Gyn. Brit. Emp.*, 1926, **33**: 17.
2. STANDER, The Toxæmias of Pregnancy, Williams and Wilkins, Baltimore, 1929, 61.
3. DE WESSELOW, *J. Obst. & Gyn. Brit. Emp.*, 1922, **29**: 21.
4. LAZARD, *Am. J. Obst. & Gyn.*, 1925, **9**: 178; 1926, **12**; *Am. J. Surg.*, 1927, **3**: 433.

5. TITUS, DODDS AND WILLETS, *Am. J. Obs. & Gyn.*, 1927, **14:** 89; 1928, **15:** 303.
6. MUSSEY, *ibid.*, 1926, 11.
7. ECKELT, *Zeit. f. Geburt. f. Gynäk.*, 1919, 81.
8. DE WESSELOW AND WYATT, Modern Views on the Toxæmias of Pregnancy, Constable and Co., 1924, 70.
9. BLAND AND BERNSTEIN, *Am. J. M. Sc.*, 1927, **173:** 844.
10. STANDER, The Toxæmias of Pregnancy, 53.
11. ALLEN, *J. Am. M. Ass.*, 1930, **74:** 1652.
12. O'HARE AND WALKER, *Arch. Int. Med.*, 1923, **32:** 283.
13. ALLEN AND SHERRIL, *J. M. Res.*, 1922, **2:** 429; *Zeit. f. Geburt. u. Gynäk.*, 1916, **88:** 325; *Zentralbl. f. Gynäk.*, 1921, **45:** 129.
14. ZANGEMEISTER, *Zentralbl. f. Gynäk.*, 1925, **49:** 225; Lehrbuch f. Geburt., Leipzig, 1927; *Deut. med. Wchnschr.*, 1921, **47:** 549.
15. GINGLINGER, *Bull. Soc. d'Obstét. et de Gynécol.*, 1925, **17:** 100.
16. HOLTERMANN, *Zentralbl. f. Gynäk.*, 1928, **52:** 1916; *Arch. f. Gynäk.*, 1928, **133:** 121.
17. SIDEROW, *Zentralbl. f. Gynäk.*, 1929, **52:** 1006.
18. BELL, *Am. J. Obst. & Gyn.*, 1926, **12:** 792.
19. CORWIN AND HERRICK, *J. Am. M. Ass.*, 1927, **88:** 457; CORWIN, HERRICK, VALENTINE AND WILSON, *Am. J. Obst. & Gyn.*, 1927, **13:** 617.
20. WEIR, LARSON AND ROWNTREE, *Arch. Int. Med.*, 1922, **29:** 306; ROWNTREE, *Ibid.*, 1923, **32:** 157; GREEN AND ROWNTREE, *Am. J. Physiol.*, 1927, **80:** 209.
21. STANDER, EASTMAN, HARRISON, JR., AND CADDAN, *J. Biol. Chem.*, 1929, **85:** 233.
22. MCQUARRIE, *Am. J. Dis. Child.*, 1929, **38:** 45.
23. HARDING AND HARRIS, *Proc. Roy. Soc. Can.*, 1930, **24:** (in press).

DISCUSSION

DAME LOUISE MCILROY (London) felt that here was a definite scientific pronouncement on what she had maintained from clinical experience, namely, that the giving of intravenous saline where a toxic state exists is contraindicated. She herself relied on colonic lavage.

INVESTIGATION OF THE FLORA OF THE LYMPHATIC GLANDS IN SKIN DISEASES OF UNKNOWN ORIGIN*

(A PRELIMINARY REPORT)

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UNTIL recently it has been presumed that certain skin diseases are for the most part local infections of the cutaneous surface of the body. During the last few years this belief has changed, and the change is largely due to the fact that "studies involving careful examinations of the chemistry of the blood and tissues, the secretion of sweat, the involuntary nervous system and the gastro-intestinal tract have replaced much vague speculation with well established facts."[1] These "well established facts" suggest that cutaneous disorders must in many cases be regarded as merely the local manifestations of general disorders or infections, and the modern view is to consider the inter-relationship between the skin and the various systems as being of great importance. Particularly important is the relationship of the skin to the lymphatic system. The skin and subcutaneous tissues admittedly form a vast lymphatic lake. The lymph-nodes grouped in well-defined areas and easily accessible in the groins and axillæ serve the purpose of filters for the lymphatic area. It is reasonable to suppose that if certain organisms, whether bacteria or fungi, are constantly associated with the skin lesions, their presence may be made known by an examination of the lymphatic glands which drain the territory involved.

The purpose of this investigation was to examine the flora of these glands in some of the cutaneous diseases of obscure or unknown causation which came under our notice. Our interest in this problem was aroused by the apparently intractable nature of psoriasis and similar associated conditions. As is well known, numerous etiological factors have been alleged to be associated with psoriasis, but the cause has not yet been determined.

In 1924, Civatte[2] reported to the Royal Society of Medicine that "A comparison of the histological features of psoriasis and the psoriasiform type of seborrhœic dermatitis, which may closely resemble each other, suggests that the lesions of the former are inflammatory reactions produced in the skin by a blood-borne toxin, while those of the latter are due to an external microbic infection." Barber[3] has said: "Although the actual cause of psoriasis is still unknown, a consideration of the evolution and the course of the disease points to it being due to a microörganism of low virulence, against which little or no immunity is developed. It would appear that this disease will eventually be shown to be due to infection with a specific organism, perhaps a species of the streptococcal group." He has stated further that the erup-

* Read before the Winnipeg Medical Society, Winnipeg, Manitoba, March 20, 1931. Received for publication April 9, 1931.

tion known as keratodermia blennorrhagica, which is a rare complication of gonorrhœal arthritis, resembles psoriasis both clinically and histologically, and he suggests that psoriasis may be due to an organism closely related to the gonococcus. Within the last few months a paper was published by Ingram[4] on acro-dermatitis perstans (a spreading dermatitis) and its relation to psoriasis, in which he emphasizes the similarity between these conditions and suggests that they are the result of "a definite staphylococcal dermatitis." This view would hint at a staphylococcal basis for psoriasis.

We have, then, the theories that the disease is due to: (1) a toxin (Civatte); (2) a streptococcal type of organism (Barber); (3) a staphylococcal type of organism (Ingram).

What is the source of the infection? Is it directly on to the skin surface, or is it through some other portal such as the alimentary canal, as suggested by the work of Wachowiak,[5] Schwartz,[6] and others.

The members of this society are aware of the work done by Doctors Cadham and Gibson in the study of the lymphatic glands in relation to multiple arthritis. With their work in view, I conceived the idea that the lymph-nodes, draining as they do the great skin areas of the body, might throw some light upon a possible bacterial source of some of the mysterious cutaneous diseases. They have collaborated with me in investigating the flora of the lymphatic glands in 20 cases.

The following summarizes the results:

Disease	*No. of cases*	*Positive culture*
Psoriasis	14	14
Seborrhœic dermatitis	2	0
Generalized eczema	2	0
Pityriasis rubra pilaris	1	1
Darier's disease	1	1

In the 14 cases of psoriasis, from six nodes a diphtheroid organism was isolated, from 3 a staphylococcus, and from 5 a diphtheroid together with a staphylococcus. From the nodes from the patient with pityriasis rubra pilaris a diplococcus was cultured, and from the case of Darier's disease a hæmolytic staphylococcus was recovered.

There are many diseases, such as lichen planus, dermatitis herpetiformis, pemphigus, lupus erythematosus, erythema multiforme, erythema nodosum, erythema induratum, etc., which we have not so far had an opportunity to investigate, but it is our intention, as the opportunity arises, to include these dermatoses in our studies. Obviously an investigation of a far larger number of cases is required before any definite conclusions can be drawn.

As a justifiable application of our findings we have commenced treatment with vaccines prepared from the organisms found. Long periods of observation will be necessary before any significant deductions can be made from work of this kind. The results obtained up to the present are sufficiently favourable, in our opinion, to justify publication of this preliminary report with a view to stimulating work along the same lines in other centres, so as to carry to a definite conclusion ideas which our experience up to date have proved to be of some value.

SUMMARY

1. Inguinal glands have been excised and investigated in 20 cases of skin diseases of unknown origin.

2. Fourteen cases of psoriasis yielded positive cultures. No organisms were recovered in two cases of seborrheic dermatitis and in two cases of generalized eczema. A diplococcus was cultured from the patient with pityriasis rubra pilaris and a hæmolytic staphylococcus was found in the case of Darier's disease.

3. Autogenous vaccines are being employed in the treatment of our cases.

N.B.—Drs. W. F. Abbott, C. W. Burns, L. D. Collin, G. S. Fahrni and James Prendergast have rendered valuable aid in investigating seven staff cases in Saint Boniface Hospital.

REFERENCES

1. AYRES, *Arch. Derm. & Syphil.*, 1929, **20**: 854.
2. CIVATTE, *Proc. Roy. Soc. Med.* (*Derm. Sect.*), 1924-25, **18**: 1.
3. BARBER, Taylor's Practice of Medicine (Poulton) 14th ed., p. 1016.
4. INGRAM, *Brit. J. Derm. & Syph.*, 1930, **42**: 489.
5. WACHOWIAK, *Arch. Derm. & Syphil.*, 1929, **91**: 713.
6. SCHWARTZ, *Arch. Derm. & Syphil.*, 1931, **23**: 70.

CHANGES IN BONE TUMOURS AFTER INTRAVENOUS INJECTIONS OF A COLLOIDAL SOLUTION*

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THIS paper will deal with bone sarcomata, following the classification of bone tumours adopted by the American Registry of Bone Sarcoma, *viz.*: (1) periosteal fibrosarcoma; (2) metastatic tumours, whose primary seat is in a tissue other than bone; (3) osteogenic sarcoma.

The malignant tumours of bone are mostly osteogenic sarcomata and these show an incidence, according to the recent estimates of English observers, of about one case in 75,000 of the population. In the United States there are about 30,000 deaths from sarcoma in a generation (30) years, and about 12,000 patients alive at a given time.

Sarcomata consist of connective-tissue cells of embryonic type which are separated from each other by fine strands of connective tissue and contain many blood spaces. The walls of these blood spaces are very thin, consisting at times of a single layer of endothelium, and even this layer is often absent, so that the sarcoma cells come to lie in direct contact with the blood stream and thus are very liable to be swept away to distant parts of the body in the form of metastases.

Instances of osteogenic sarcoma are occasionally seen in which, in spite of the fact that an amputation is done a few weeks after the subjective onset of the disease, death follows from pulmonary metastases. This would seem to indicate that the subjective onset does not correspond to the true onset of the disease. It seems probable, therefore, that sarcoma cells become detached from the primary growth almost synchronously with its inception. The intimate relation of the sarcoma cell to the blood stream, and the pathology of its spread, suggested the intravenous route as a practical means of its approach. A colloidal solution of a metal was chosen for the purpose, since to the colloidal state are due many extraordinary conditions, activities and effects of great scientific value.

It should, of course, be remembered that the characteristic activities of a metal are only partially shown when it is in organic combination. Furthermore, it has been demonstrated by means of a metal, *e.g.*, bismuth, which exists both in the form of a stable type and as a radioactive isotope, that when the metal is introduced into the animal organism it is not assimilated by means of combination with the carbon within the animal, *i.e.*, in organic combination and hence non-ionizable, but in the form of a dissociable salt which is soluble with difficulty. Also, the metallic (elemental) metal has quite different properties from the ionic form. For example, the great activity of metallic sodium, the Na atom, is due to its eleventh electron being in a 3_1-orbit, from which it can be removed with relative simplicity by chemical agencies. On the other hand, the sodium ion, which has already parted with this 3_1-electron, possesses a stability resembling that of an atom of a rare gas (neon), hence the reasons for employing the metallic (elemental) metal in colloidal solution, which affords a very slow and prolonged action of continuous minute doses of the active elemental form that may be of much practical value.

It was known that if a positively charged colloid, such as ferric hydroxide or lead hydroxide, is injected directly into the veins it will cause precipitation of the negative proteins of the blood. A negatively charged colloid would not do this. Hence it is safe to use the colloid only in this form. Further, it has been shown that the nucleus of the cell contains certain basic substances, and thus with a negatively charged colloid the metabolism of the cell might

* Presented at Special Academy Meeting, Academy of Medicine, Toronto, March 11, 1931.
Received for publication March 30, 1931.

be so altered that division of the cell is impossible.

The solution employed in this research was a colloidal solution of metallic (elemental) arsenic, made by the technique of Prof. E. F. Burton, of the University of Toronto. Cataphoresis had shown that the colloidal particles were negatively charged and hence safe for intravenous injection. Animal experimentation also demonstrated that the solution, when given intravenously, was non-toxic and produced no untoward effects, either immediate or remote.

To demonstrate the changes in the pathology of bone tumours following a series of intravenous injections of the solution for varying periods, stereoscopic films were made at intervals of about three months, since the radiogram is one of the most important single findings which will at once allow of conclusions as to the changes observed. Biopsy was not considered advisable. The changes observed may, perhaps, be best illustrated by short case reports of four of the series in conjunction with the pictures.

CASE 1

A boy, aged 18 years, under the care of Dr. G. W. Hawk, of the Robert Packer Hospital, Sayre, Pa. Dr. Hawk wrote that on November 24, 1928, he had removed a moderately large tumour mass from the lower third of the right femur. A diagnosis was made, from a frozen section, of sarcoma in connection with the periosteum, and deep x-ray therapy and Coley's fluid was given.

FIG. 1.—*Case 1.*—At beginning of treatment.

FIG. 2.—*Case 1.*—After 3 months' treatment.

FIG. 3.—*Case 1.*—One year later.

On January 30, 1929, the boy had a fall and suffered a fracture of the shaft of the femur near the site of the affected area. He was given the usual treatment for fracture, but x-ray examination by Dr. Hawk on April 1st, after stereoscopic films were made, showed practically no union of the fracture. The case was then sent to Toronto, admitted to hospital where stereoscopic films were made. These showed practically no union of the fracture, but an area on the shaft about two and a half inches above the fracture showed periosteal roughening and proliferation.

The boy received a series of intravenous injections of the colloidal solution, extending into July, but no deep x-ray therapy. The case was then examined radiologically after stereoscopic films were made by Dr. W. H. Dickson, of the Toronto General Hospital, who reported: "Good union is now present and no disease of the bone can be seen".

In August the boy returned to his home and reported to Dr. Hawk, the surgeon who had operated in November, 1928. The surgeon wrote us as follows: "On August 14, 1929, Master R. reported to this clinic for examination. We find he has good union of the fracture. We again took some x-ray films and compared them with our previous exposures, and we are glad to report that there is absolutely no evidence of recurrence. He has thrown out a large amount of callus and it looks fine. Palpation of the leg at the present time is practically negative."

On March 18, 1930, the boy again reported to Dr. Hawk, who, after stereoscopic films had been made and examined, reported to us that there were no signs of recurrence. He also reported here in April, 1930, and December, 1930, with a like result.

CASE 2

A female, married, aged 43 years, under the care of Dr. Harvey Cushing, Boston. She was suffering from paraplegia and severe brachial neuralgia.

Their radiographic report, dated October 1, 1929, described a definite destructive process involving the neck of the second rib on the right side, the adjacent transverse process and the body of the second thoracic vertebra. The last was atrophic in appearance, mottled, and slightly collapsed. They interpreted this as being a malignant process. They were unable to state whether this was a primary growth or secondary to some other primary focus.

To us the patient gave a history of having had in the previous July two small lymphatic glands removed from the right axillary region. We considered that the growth in the spine was probably secondary to these, since primary growths of the vertebra are very uncommon. Dr. Cushing advised against operation, so deep x-ray therapy was given.

The patient was brought to Toronto on October 15, 1929, and remained until May, 1930. She received a series of intravenous injections of the colloidal solution along with deep x-ray therapy. The injections were discontinued the end of March.

Radiographic examination on January 22, 1930, showed the body of the vertebra well recalcified, and another set of stereoscopic films, made on March 31st, showed the vertebra apparently free from involvement.

The patient was seen by Dr. William Goldie on May 9, 1930. From his report after examination is the following: "The evidence showed that whatever had caused the brachial neuralgia had subsided and that there was a definite improvement of the paraplegia. There was a partial return of power below the fourth dorsal with excessive, sharp and prolonged reflexes and dulling skin sensation. The x-ray films showed a marked change from the original condition".

CASE 3

A male, aged 23 years, under care of Dr. Joseph Colt Bloodgood, Baltimore, Md. Their radiographic report, dated November 4, 1929, is as follows: "Left femur—Osteogenic sarcoma involving the periosteum and cortex of the upper half and outer aspect of the left femur with infiltration into the soft structures. The periosteum on the outer aspect chiefly appears destroyed, and the medullary canal in this region is fairly well preserved and reveals dense bony shadows overlying it."

The patient was sent here in January, 1930, and after radiographic examination on January 21, 1930, a series of intravenous injections of the colloidal solution was begun and continued for a considerable period. During March deep x-ray therapy, immediately preceded by intravenous injection, was given.

On May 16, 1930, stereoscopic films were again made and these were carefully compared by Dr. Richards, Director of the Department of Radiology, Toronto General Hospital, with those dated, January 21st, who reported: "There is very little material change in the interval which has elapsed. In one or two areas there appears to be evidence of some increase in calcification which would be an evidence of improvement. The evidence of destruction on the external aspect of the cortex still remains, but I think this has not increased, which is perhaps the most favourable sign."

On August 25, 1930, Dr. Richards again made stereoscopic films, and on September 5th reported: "I have carefully compared the recent films with those dated January 21st and May 16th. There is evidence of increase both in the extent of the tumour formation and in the density of it. There is, however, more increase in this respect between January and May than there has been between May and the date of the present examination. I believe the involvement appears to be in that part of the tumour which extends into the soft tissues and not in the direction of the medulla of the bone. The cortex is involved very much in the same manner as previously described, and this has not increased in the interval. The increase in density of the bony structure in the growth may be interpreted as new bone formation and may either represent a process of healing and recalcification or actual increase in the amount of bony growth. I do not feel that a positive differentiation between these two possibilities can be made."

Films were again made on November 6, 1930, and on January 21, 1931, and these showed similar results.

CASE 4

A male, aged 26 years. He gave a history of having a large tumour mass partially removed from the region of the left iliac crest. It recurred, however, and grew rapidly, encroaching upon the abdominal area and invading the soft tissues of the left buttock.

The patient was brought here in May, 1930, and stereoscopic films were made on May 23rd, and on May 26th. Dr. Richards reported: "There is evidence of a destructive process lesion arising from the crest and wing of the left ilium and characterized by the presence of numerous areas of bone development in the soft tissues. In the latter there is a very large mass throughout in which the bone structure is clearly visible. In my opinion the picture is characteristic of osteosarcoma, with an extreme degree of development."

Intravenous injections of the colloidal solution were then begun and have been continued to the present. On September 3, 1930, Dr. Richards made stereoscopic films, and on September 4th reported: "There is almost no difference visible in the two examinations made May 26th and the present; towards the medial portion of the abdomen there is also a suggestion that the soft part of the tumour has extended up and towards the mid-line. Otherwise, the two films are almost duplicates of each other."

On December 12, 1930, Dr. Richards again made stereoscopic films and carefully compared them with those made September 4th and reported: "The area of destruction previously reported present in the left ilium is still present and superimposing one film upon the other indicates that this has not increased, but I think the soft tissue mass has distinctly increased as evidenced by the presence of new bone production throughout the soft structures,"

Again on March 17, 1931, stereoscopic films were made and these were carefully compared by Dr. Richards with the previous films throughout this case. Dr. Richards reported: "In my opinion, they show a slight degree of further progress, in which the area of destruction in the iliac bone is slightly more marked and is surrounded by a slightly greater degree of increased density in the bone, but this difference is not very marked and on the whole it may be said that the degree of involvement remains very nearly the same as at the examination dated, December 12, 1930. No new areas of bony involvement have developed and the calcareous deposits in the soft tissues seem to be about the same distribution."

Deep x-ray therapy has not been employed at any time in this case.

Among present day research workers in the treatment of bone sarcoma, calcification and ossification is usually looked upon as a very

FIG. 1.—*Case 4.*—At beginning of treatment.

FIG. 2.—*Case 4.*—After 3 months of treatment.

FIG. 3.—*Case 4.*—After 6 months of treatment.

FIG. 4.—*Case 4.*—After 10 months of treatment.

encouraging sign of the effects of treatment. When this is accompanied by a retardation or cessation of bone destruction by the tumour cells the result is a very striking one. In all of the cases of this short series increased calcification and ossification were noted in the radiograms, together with apparent retardation and cessation of bone destruction by the tumour cells. It is usually assumed that the erosive action upon the involved bone is affected by the tumour cells only while they are un-differentiated and rapidly growing, and hence plastic, mobile, and possibly phagocytic, though not in the strict sense of the word as used by Champy.

Some observations made during the treatment of carcinoma with the colloidal solution also led to the conclusion that the young, un-differentiated and plastic cancer cells were similarly destroyed.

To Dr. G. E. Richards, Director of the Department of Radiology, the Toronto General Hospital, we owe much for his great assistance in making careful comparative reports on the stereoscopic films in the cases.

THE PHYSIOLOGY OF THE PARATHYROID GLANDS*

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SINCE comprehensive reviews of the physiology of the parathyroid glands and of calcium metabolism have been published,[10, 21, 31] it will be our purpose to discuss in detail only the more recent developments in this field.

The function of the parathyroid apparatus, in so far as we understand it at present, is that of a regulator of calcium metabolism. This function is apparently directed toward the maintenance of a definite level of total calcium in the circulating plasma and is subserved by the action of the internal secretion elaborated by the glands. The exact mechanism by which this result is attained is still unknown. The recent work of Hunter[21] points to a specific effect of the parathyroid hormone on the activity of the osteoclasts of bone. Also it has been abundantly proved that the increase in the blood serum calcium which is observed following the injection of the parathyroid hormone is due to the mobilization of this element from the bone reservoirs.

As the physiology of the parathyroid gland is so very closely associated with the biochemistry of calcium, it will be of interest to review briefly some of the outstanding facts in regard to calcium metabolism.

Calcium is one of the essential inorganic elements concerned in vital processes. While the amount of this substance which naturally occurs in living tissue is very minute as compared, for example, with sodium and potassium, it is nevertheless of equal significance. The calcium content of human blood serum of the normal subject is between 9 and 11 mgm. per cent, while that of the plasma, according to Stewart and Percival,[31] may be 10 to 15 per cent higher. It is of interest that the calcium content of red cells is very low. Some workers claim that the red cell is calcium-free, but others have found appreciable amounts therein.[22, 23] The calcium which is present in the circulating plasma exists in different forms, but until more exact methods have been developed for the estimation of these special fractions it is useless to dogmatise on the significance of any one of them. On *a priori* grounds one might expect the ionized calcium to be most significant. The amount of ionized calcium is probably never more than 2 mgm. per cent; the remainder exists in non-ionized form, both in organic and in inorganic combination. The organically bound calcium is non-diffusible and represents approximately 4.5 mgm. per cent of the serum calcium. The total calcium content of spinal fluid is from 5 to 6 mgm. per cent. According to Cameron and Moorhouse,[9] this represents the diffusible calcium of the plasma.

The calcium content of muscle and the

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* A paper read in the Section of Bacteriology, Pathology, Physiology, and Biochemistry, ninety-eighth annual meeting of the British Medical Association, Winnipeg, August 28, 1930.

parenchymatous tissues is lower than that of blood plasma, values from 4 to 7 mgm. per cent having been obtained. To what extent the calcium of tissue is intracellular can only be conjectured, but if the distribution parallels that obtaining in the blood, the calcium content of the tissue cells must be very low indeed.

The level of blood calcium in the normal subject remains constant, but nevertheless calcium is continuously being added to it as a result of the absorptive processes in the upper intestinal tract, and removed therefrom through the excretory channels of kidney and bowel as well as by deposition in bone.

The chief use of calcium is in relation to the building up of the structural elements of bone and tooth, and it plays a very important rôle in a number of physiological processes, such as in the clotting of blood and coagulation of the caseinogen of milk. More important still, it influences in a very specific manner neuromuscular tone and irritability. This latter effect is probably due to ionized calcium, and since changes in blood pH can influence the degree of ionization of the calcium there may be no essential difference between true parathyroid tetany due to a lowered calcium content of the blood and the tetany of over-ventilation, or of alkalosis, associated with a normal blood calcium but a diminution in ionization due to an increased pH.

ABSORPTION

There are many factors which influence the absorption of calcium from the alimentary canal, such as the nature of the calcium compounds themselves, the pH of the intestinal contents, and the type of foodstuffs, as well as other inorganic substances present. Since calcium is excreted into the lower bowel it is impossible to estimate from an analysis of the fæces obtained over a known calcium dietary regime how much calcium has been absorbed or how much excreted. It has been very difficult, therefore, to obtain reliable information as to the degree of assimilation of orally administered calcium compounds. Irrespective of the type of compound which is administered orally it is probably absorbed in the ionized form.

Therefore, any soluble salt, such as the chloride, lactate, or gluconate, will be more assimilable than the phosphate or carbonate. Lactose administered with calcium appears to influence its absorption favourably. Bergeim[8] has attributed this result to an increased production of lactic acid in the intestine. Also, the normal acidity of the stomach contents must influence the ionization of calcium compounds present in the food and hence facilitate their absorption. The presence of phosphate and carbonate will inhibit the assimilation of calcium due to the formation of relatively insoluble compounds. A slight acidity of the intestinal contents probably affords the most favourable circumstance for the absorption of calcium.

Recent work with vitamin D has shown that this substance influences directly the absorptive process for calcium, and it is probably true that the main factor in the assimilation of calcium is the normal functioning of the mucous membrane of the small intestine, and in this vitamin D appears to play a very definite regulatory action.

EXCRETION

Walsh and Ivy,[35] by the use of dogs with Thiry-Vella fistulæ, have shown that calcium is actively excreted by the lower ileum and colon. The fæcal calcium represents, therefore, both the unabsorbed calcium of the food and re-excreted calcium. Calcium is excreted by the kidney in the normal subject in amounts varying from 0.1 grm per day on a low calcium diet to 0.5 grm. on a normal diet. Acid-forming diets tend to increase the urinary calcium. This fact has been made use of by Aub and his associates in the treatment of lead poisoning.[4] The production of a condition of acidosis by the ingestion of ammonium chloride in amounts of 12 grm. per day increased the daily output of calcium in the urine from 0.1 to 1.1 grm. in three days without affecting the fæcal calcium.

On a diet very low in calcium the excretion of the element is markedly reduced, but not completely so. The calcium reserves of the skeletal tissues are drawn upon under such circumstances in the endeavour to maintain the normal level of blood calcium. This protective mechanism tends soon to fail and the blood calcium level falls; with low blood calcium tetany, or latent tetany, may appear.

The daily requirement of calcium in the adult has been given by Sherman as from 0.4 to 1 grm. per day.[30] During the growth period the daily requirement is, however, very much more. Also during pregnancy and lactation there is a much greater demand for calcium, and unless the supply be adequate the calcium reserves of bone are drawn upon to supply the needs respectively of the growing fetus and milk production.

Relation of Inorganic Phosphorus to Calcium

Calcium metabolism is closely linked with the metabolism of phosphorus and changes in the inorganic phosphate content of either food or blood may profoundly affect calcium metabolism. Thus a disproportion between calcium and phosphate in the food (excess phosphate) may result in the assimilation of comparatively little calcium. The raising of the inorganic phosphate of the blood, as by the injection of sodium phosphate solution, leads at once to a marked fall in the level of blood calcium. The ratio between calcium and inorganic phosphate in the blood is of equal significance to the actual value of either, and in all cases of frankly disordered calcium metabolism the inorganic phosphate of blood serum, as well as the calcium content, should always be determined. We have had many examples of the importance of this ratio in our studies of experimental tetany. Thus a low blood calcium may be well tolerated in the presence of a low serum inorganic phosphate. Fatal tetany has been observed in the presence of a comparatively mild hypocalcæmia but associated with a marked increase in serum inorganic phosphate. This is perhaps best illustrated by a comparison of the effects of parathyroidectomy in the dog and rabbit. Removal of the parathyroid glands in the dog is followed by a gradual and progressive fall in the blood serum calcium. The inorganic phosphate of the blood tends to remain stationary during the first period (some hours to two days) and then it may slowly rise. Tetany appears and, if untreated, results in death in a variable period of time, depending largely on the pre-operative treatment of the animal. In the case of parathyroidectomy in the rabbit, one observes a much more rapid increase in inorganic phosphate of serum, with the result that most severe and usually fatal tetany occurs within a much shorter interval of time. The blood serum calcium may, for instance, be 8 mgm. per cent, with an inorganic phosphate of 11 mgm. per cent at the time of death from tetany within 14 hours of parathyroidectomy.

Hess[17] in contrasting infantile tetany and infantile rickets has pointed out that the former may supervene suddenly in the course of the latter disease, and its appearance is associated with a change in the calcium-phosphorus ratio of the infant's blood. This change in ratio results both from a fall in the blood serum calcium and a rise in the inorganic phosphate.

The Internal Secretion of the Parathyroid Glands

It is a remarkable fact that the maximum physiological activity of the parathyroid glands has only been obtained after the fresh or acetone-preserved tissue has been treated as a preliminary step with 3 per cent hydrochloric acid in a boiling water bath for forty minutes. Prolonged acid hydrolysis results in destruction of the active principle, but a definite degree of hydrolysis appears to be essential to free the hormone from the linkage in which it is bound in the intact normal gland.[10, 2] It must be assumed that the intact glands in the course of their normal functioning are able to liberate the active principle in small amounts as required, a process which *in vitro* requires a strong acid reaction.

The purification of the active principle has not yet been carried beyond a proteose-like fraction obtained by submitting the original hydrolysate to repeated salting-out processes and isoelectric precipitations. Either the hormone itself is of protein nature, or else it is intimately associated with such a substance. It has been repeatedly shown that all demonstrable physiological activity of active extracts is completely lost by treatment with either of the proteolytic enzymes pepsin or trypsin. Also all our attempts to devise some effective method of oral administration of the hormone have met with complete failure.

The physiological effect of the hormone is that of a mobilizer of blood plasma calcium, and there is ample proof that the source of

the additional calcium which appears in the blood stream under the influence of the extract is bone. There is a great difference in the effect of the hormone in different species. The dog is the only laboratory animal which is satisfactory for standardization of the extract. The normal dog responds as a rule to injections of the parathyroid hormone by a rise in blood serum calcium, which is related to the size of the dose administered. If sufficient extract is given marked hypercalcæmia develops and with it a train of symptoms are ushered in which invariably result in death of the animal. The symptoms in the order of their appearance are anorexia, vomiting, diarrhœa, muscular weakness, lassitude, respiratory distress, passing of blood by the bowel, bloody vomit and finally complete collapse.

A study of the progressive changes in blood chemistry during parathyroid hormone overdosage has been very instructive. The blood serum calcium curve may be represented as a gradual ascent to a level of 20 mgm. per cent. It remains at this level for some hours, then in the terminal stages it usually falls a few milligrams per cent. The inorganic phosphorus of the serum is practically unaffected until the blood serum calcium has reached a level of 15 mgm. per cent. It then rises rapidly and continuously till death ensues. Coincident with the rise in inorganic phosphorus there is evidence of rapid failure of kidney function and in addition to suppression of urinary secretion the non-protein nitrogen and urea of the blood increase at a uniform rate until at death values of well over 100 mgm. per cent of urea nitrogen are reached; also there is evidence of a marked acidosis in the latter period.

No untoward symptoms are manifested by the dog as a rule until the blood serum calcium has reached 15 mgm. per cent. Dogs may be maintained in a condition of mild hypercalcæmia over a period of weeks by small daily doses of the hormone without any marked ill effects, although such treatment undoubtedly causes a great loss of skeletal calcium due to excessive excretion in the urine of calcium salts.

Tissue analyses for calcium made at different levels of hypercalcæmia indicate that apart from the kidney no marked increase in the calcium content of such tissues as muscle and liver occurs until the peak of the curve of serum calcium has been passed and the terminal phenomena of parathyroid hormone overdosage have appeared. The kidney tissue at the terminal stage of acute parathyroid hormone overdosage may contain more than 250 mgm. per cent of calcium, while heart muscle has been found at times to contain more than 50 mgm. per cent. The liver may contain a greatly increased amount, or it may show only a moderate increase. Muscle does not take up any great amount, as values over 12 mgm. per cent have not been observed. The excessive deposit of calcium salts in the kidney is due to the final failure of this organ to combat the high blood calcium by excretion. It becomes clogged with the substance it is endeavouring to eliminate. The excessive and selective absorption of calcium by the heart muscle is of great interest and no doubt accounts in part at least for the peculiar irregularities of the heart in parathyroid hypercalcæmia which have been studied by Edwards and Page.[11]

Experimental chronic parathyroid hypercalcæmia results in serious depletion of the calcium stores and a condition of metastatic calcification of certain soft tissues associated with nephrolithiasis.[20]

Probably there is no better example of chronic hypercalcæmia due to hyperfunctioning of the parathyroid glands than the clinical entity of generalized osteitis fibrosa recently reviewed so excellently by Hunter.[21] The study of these clinical cases of true hyperparathyroidism has done much to further elucidate the physiology of these glands, particularly as relating to the human subject.

Before discussing these recent contributions from the clinical side more in detail, I should like to refer to the extraordinary differences which exist as between species in the response to administered parathyroid hormone. The dog is, as we have seen, specially sensitive to this hormone, and excessive dosage causes death. The cat is less sensitive, and some workers have found difficulty in producing hypercalcæmia by the use of the extract, while others have had varying success. The normal rat and rabbit are practically immune to the hormone in so far as changes in blood chemistry are concerned. An amount of extract which is

sufficient to kill 10 dogs may be administered to a rabbit without ill effects. On the other hand, relatively small amounts of the extract have prevented the fall in blood calcium in the parathyroidectomized rabbit and have offset the development of tetany. It is possible that there is some fundamental difference in the manner in which the calcium reserves are laid down and given up in different animals. There is also the possibility that the excretory channels are more effective and responsive to slight changes in the blood calcium in some animals than in others. This possibility must be further tested by appropriate experiments.

We have been unable to demonstrate any effect of injections of the hormone in non-laying hens, yet it has been shown by Riddle and Reinhart[28] that the calcium content of the blood serum of the dove is directly related to the phases of the sex cycle. During ovulation there is an increase of 100 per cent in the blood serum calcium. Sun and McOwan[32] have recently reported a study of the calcium content of the blood serum and the histological structure of the parathyroid glands of the mature Leghorn hen as affected by ovulation. They found, in brief, during the period when the egg weighed 0.1 grm. or less an average value of 13.7 mgm. for blood serum calcium. Egg weights between 9 and 18 grams were associated with an average of 25.6 mgm. per cent of serum calcium, and egg weights of from 30 to 57 grm. gave an average of 19.25 mgm. for serum calcium. Also definite histological changes in the parathyroid glands were associated with the high blood calcium values. These changes consisted in a distortion of the columns of cells associated with an apparent increase in the connective tissue of the trabeculæ and were more closely linked with the period of falling blood serum calcium.

The active extract has been shown to be specific for the treatment of parathyroid tetany, and completely parathyroidectomized dogs have been kept in a normal condition with normal blood calcium and phosphorus levels when adequate doses have been administered. Aub[4, 6] however, has reported that in the human subjects treated over a prolonged period with the hormone a condition of immunity to the specific calcium-mobilizing effect may develop. He has shown that this is not due to a depletion of calcium reserves, as the administration of ammonium chloride to such a case was followed by an increased excretion of calcium. Considerable variation in the blood response of the human subject has also been reported. One individual may respond well to the extract, while another may show little or no change in the blood serum calcium content following a course of injections. Somewhat similar conditions are found in dogs, though non-reactors are not so frequently met with, but because there are such, it is necessary to use at least 10 or more animals in standardizing the preparation. This is in order to take care of individual variations in response to the injection of the hormone.

While it is definitely established that parathyroid activity influences calcium metabolism in a very profound manner, it must also be remembered that calcium metabolism is affected by a number of other factors, such as diet, acidosis, alkalosis, exophthalmic goitre, and more particularly vitamin D. A low calcium diet has been found to produce a depletion of the calcium salts in trabeculæ of bone.[6] A lowering of blood serum calcium has also been produced by low calcium diets.

Acidosis causes an increased calcium excretion and an increase in the degree of ionization of blood calcium. Alkalosis has somewhat the reverse effect. Osteoporosis of marked degree has been observed in certain cases of exophthalmic goitre in which there has been no evidence of parathyroid gland disease.[21]

Vitamin D has an effect on calcium metabolism almost equal to that of the parathyroid glands, and it is as yet an unsolved problem as to what is the exact interrelationship of function between vitamin D and the parathyroid hormone. Vitamin D administered to dogs in excessive amounts has produced fatal hypercalcæmia with associated symptoms very similar to those manifest during parathyroid hormone over-dosage.[33] Also vitamin D has been shown to relieve parathyroid tetany and to raise the blood serum calcium in the parathyroidectomized animal. Taylor has recently found that the beneficial effects of vitamin D in the form of irradiated ergosterol gradually fail in totally parathyroidectomized dogs, and that the treated animals ultimately die of tetany, although the treatment prolongs their lives for a matter of days.[33] Watchorn[37] and Ashford[3] have recently

shown that in hypervitaminosis D in rats and rabbits respectively a great increase in the excretion of calcium occurs. The work of Massengale and Nussmeier[25] on chicks suggests that the production and maintenance of hypercalcæmia by excessive administration or irradiated ergosterol is largely dependent on the presence in the food of adequate amounts of calcium. Hypercalcification of bone has been reported by Hess and his associates[16] as a result of vitamin D overdosage in a young human subject. Freeman and Farmer[13] found a decrease in the percentage of diffusible calcium of the serum in vitamin D overdosage in the rabbit. This was associated with an increase in the total serum calcium.

That vitamin D hypercalcæmia is definitely linked with increased calcium absorption appears to be established. Whether it can cause mobilization of calcium from the bone reserves is not so clear; if it causes this latter effect, is the action a direct one, or do the parathyroid glands act as an intermediary? No final answer is to be had to this question with our present knowledge of the subject. There is other definite evidence that parathyroid gland function and vitamin D are closely linked. Recently Morgan and Garrison[27] have found that young dogs reared on artificial diets with a Ca: P ratio of 1.18 to 1.64 without vitamin D respond but little to parathyroid hormone injections, whereas similar dogs given vitamin D show abnormally large increases in serum calcium and inorganic phosphate when injected with the parathyroid extract.

Also Higgins and Sheard[18, 19] have noted hyperplasia of the parathyroid glands of chicks reared under blue or amber glass. Two per cent of cod liver oil in the diet of control birds prevented this reaction of the parathyroid tissue. These authors express the opinion that the visible as well as the ultra-violet rays of sunlight are essential for normal parathyroid development.

CLINICAL CONDITIONS IN WHICH CALCIUM METABOLISM OR PARATHYROID FUNCTION IS DISTURBED

Tetany.—Post-operative tetany represents the nearest clinical parallel to parathyroidectomy in the dog. As a rule it is due in part to removal of a portion of the parathyroid apparatus and trauma of the remainder. Trauma of the parathyroid glands leads to a marked suppression of function which, however, is not permanent. Fatal tetany may occur in a rabbit following traumatization of the glands. Treatment should consist of large doses of calcium salts by mouth, or of subcutaneous injections of parathyroid hormone or intravenous calcium chloride if the condition of the patient is acute. Vitamin D therapy should also be of value. Complete parathyroidectomy in the human subject is a matter of grave concern, since it may require long-continued treatment, and if such a case develops an immunity to the hormone adequate control of the calcium metabolism may become impossible and death result.[4] Since the introduction of irradiated ergosterol it is possible that such a fatality may be avoided in the future.

In the tetany of spontaneous hypo-parathyroidism there is as a rule a lowered blood serum calcium and an increased inorganic phosphate. It is of interest to note that lesions of the ectodermal tissues, such as cataract, brittleness and ridging of the nails, and enamel defects of the teeth, have been described in association with hypo-parathyroidism in the human subject. Cataract has been observed in rats six months after parathyroidectomy.[12] It is also a common occurrence in parathyroidectomized dogs.

Infantile tetany does not differ materially from tetany of spontaneous hypoparathyroidism in the adult in so far as the blood chemistry picture is concerned. Since infantile tetany is so frequently associated with infantile rickets it is evident that its etiology is not entirely a matter of hypoparathyroid-function. Hess,[17] in discussing this question, says "the simple theory of a deficiency of calcium due to a lack of function of the parathyroid glands is not absolutely satisfactory. Some other factor seems to be involved. We do not find the parallelism we should expect between tetany in infants and in animals, and the decrease of calcium in the blood. In other words, although calcium and the function of the parathyroid glands play the dominant rôle, there seem to be other factors which qualify their effect in relation to the development of tetany."

Hyperventilation, or "alkalosis tetany," is

met with clinically in the form of spontaneous tetany due to over-ventilation. It may also occur in the presence of alkalosis due to excessive alkalinization, or as a result of loss of HCl through vomiting. There is no change in the blood serum calcium in such cases, but a decrease in the degree of ionization due to the increased pH of the blood.

Osteomalacia.—Although the bone changes observed in osteomalacia are not of the same type as those seen in typical rickets the general view at present is that osteomalacia is the counterpart in adult life of low calcium rickets in children. A low blood serum calcium is uniformly found in osteomalacia with or without an increased inorganic phosphorus. Tetany is also a common occurrence in this disease. The most constant metabolic phenomenon is a net loss in calcium.[26]

Hunger osteopathy.—Various forms of hunger osteopathy occurred in Austria, Germany and Poland during the war.[21] Detailed blood chemistry studies in such cases are lacking, but the causative factors were undoubtedly lack of vitamins, chiefly D, and of calcium and phosphorus in the diet. Rickets, late rickets, osteomalacia and Paget's disease all increased greatly both in incidence and severity during this period. Marked hypertrophy of the parathyroid glands was observed by Schmorl[29] in a man of 73 who had suffered from hunger osteomalacia.

Renal rickets and cœliac rickets.—In both of these conditions a lowered blood serum calcium has been found. The blood inorganic phosphorus in renal rickets is usually greatly increased, values as high as 14 mg. having been reported. Inorganic phosphorus in the blood serum of cases of cœliac rickets has not been very thoroughly investigated. Vollmer and Serebrijski[34] have reported a case in which the blood serum phosphorus was 2.9 mgm. and the calcium 5.4. It is stated that the osteoporotic bones of cœliac rickets tend to fracture, whereas in renal rickets the bones are more elastic and tend to bend.

Chorea.—Suggestive evidence that a slightly lowered calcium content of both blood serum and cerebro-spinal fluid exists in chorea has recently been obtained by Warner.[36] Coincident with recovery this investigator observed an increase of 0.59 mgm. in the cerebro-spinal fluid calcium.

Generalized osteitis fibrosa of von Recklinghausen. — Hunter[21] has recently reviewed the literature relating to this type of case, and has been able to add some of his own cases in which most detailed studies of calcium metabolism and bone pathology have been carried out. Fourteen cases have been published to date and there is every evidence that in this disease the underlying cause is a condition of hyperparathyroidism, associated as a rule with a parathyroid tumour. Among some of the noteworthy cases of this disease recently reported are those of Mandl,[24] Hannon,[14] Barr[3] and associates, and Hunter.[21] The main findings as regards blood chemistry and metabolism in this disease are hypercalcæmia and an excessive excretion of calcium salts, especially by the kidneys. There is usually a lowered inorganic serum phosphate and the plasma phosphatase is greatly increased. According to Hunter, radiograms show a greatly diminished density of all bones examined as compared with controls of normal subjects of like age, size and sex. Cyst-like areas, some of them trabeculated, may be present. Extensive areas of decalcification may occur and spontaneous fracture is a frequent occurrence. A local condition of giant-cell tumour has been mistaken for sarcoma.[7] Microscopic examination of the bone reveals no evidence of true osteomalacia. There is a great decrease in the calcium salts of the bone, which have been removed by a process of lacunar resorption by osteoclasts. The resorption is widespread, but is accompanied by focal formation of new bone.[21] Bilateral renal calculi were found in Barr's case.

In the 14 cases which have been reported of the blood serum, calcium varied from 13.1 to 23.6 mgm. per cent, and the plasma phosphorus between 1.0 and 2.7 mgm. The calcium output in the urine varied from a slight increase to an eightfold increase. These observations are of the greatest interest for they afford for the first time a means of contrasting spontaneous hyperparathyroidism in man with parathyroid hormone overdosage in the dog. The essential difference appears to be in regard to the inorganic phosphorus response. This factor remains normal or sub-normal in man in hyperparathyroid-

ism, whereas it rises to high levels in the dog in parathyroid hormone overdosage. It is for this reason that death occurs in the dog, whereas the human subject can apparently withstand for a long period a high level of blood calcium produced by hyperfunction of the parathyroid tissue. The changes which are brought about in the skeletal structures in this disease are, however, parallel with the results obtained in normal animals treated with parathyroid extract over a prolonged period.

The diagnosis of hyperparathyroidism can now be made on the basis of radiograms and blood chemistry. Treatment has been surgical, and either a parathyroid tumour has been found and removed or else normal glands have been removed. After the removal of a parathyroid tumour the blood calcium has been observed to fall rather rapidly, and subnormal values have resulted in some cases to such an extent as to precipitate attacks of tetany. This post-operative condition has been controlled where it has appeared by calcium and parathyroid therapy.

REFERENCES

1. ALBRIGHT AND ELLSWORTH, *J. Chem. Invest.*, 1929, **7**: 183.
2. ALLARDYCE, unpublished work.
3. ASHFORD, *Biochem. J.*, 1930, **24**: 661.
4. AUB, *Harvey Lectures*, 1928-29, p. 151; *Boston Med. & Surg. J.*, 1926, **194**: 844.
5. BARR, BULGER AND DIXON, *J. Am. M. Ass.*, 1929, **92**: 951.
6. BAUER, AUB AND ALBRIGHT, *J. Exper. Med.*, 1929, **49**: 145.
7. BECK, *Arch. f. klin. Chir.*, 1928, **152**: 123.
8. BERGEIM, *J. Biol. Chem.*, 1926, **70**: 51.
9. CAMERON AND MOORHOUSE, *J. Biol. Chem.*, 1925, **63**: 687.
10. COLLIP, *Harvey Lectures*, 1925-26, p. 113.
11. EDWARDS AND PAGE, *Am. J. Physiol.*, 1926, **78**: 235.
12. ERDHEIM, *Mitt. a. d. Grenzgeb d. Med. u. Chir.*, 1906, **16**: 632.
13. FREEMAN AND FARMER, *Proc. Soc. Exper. Med. & Biol.*, 1930, **27**: 970.
14. HANNON, SHORR, MCCLELLAN AND DUBOIS, *J. Clin. Invest.*, 1930, **8**: 215.
15. HESS, LEWIS AND RIVKIN, *J. Am. M. Ass.*, 1928, **90**: 783.
16. HESS, WEINSTOCK AND ROOKER, *Proc. Soc. Exper. Biol. & Med.*, 1930, **27**: 298.
17. HESS, Rickets and Osteomalacia, Lea & Febiger, Philadelphia, 1929.
18. HIGGINS AND SHEARD, *Am. J. Physiol.*, 1928, **85**: 299.
19. HIGGINS, FOSTER AND SHEARD, *Am. J. Physiol.*, 1930, **94**: 91.
20. HUEPER, *Arch. Path. & Lab. Med.*, 1927, **3**: 14.
21. HUNTER, *The Lancet*, 1930, **1**: 897; *Proc. Roy. Soc. Med.*, 1929, **23**: 27.
22. JONES, *J. Biol. Chem.*, 1921, **49**: 187.
23. LEIBOFF, *J. Biol. Chem.*, 1930, **85**: 759.
24. MANDL, *Zentralbl. f. Chir.*, 1926, **53**: 260; *Zentralbl. f. Chir.*, 1929, **56**: 1739.
25. MASSENGALE AND NUSSMEIER, *J. Biol. Chem.*, 1930, **87**: 415.
26. MILES AND FENG, *J. Exper. Med.*, 1925, **22**: 433.
27. MORGAN AND GARRISON, *J. Biol. Chem.*, 1930, **85**: 687.
28. RIDDLE AND REINHART, *Am. J. Physiol.*, 1926, **76**: 660.
29. SCHMORL, *Münch. med. Wchnschr.*, 1919, **66**: 1057.
30. SHERMAN, *J. Biol. Chem.* 1920, **44**: 21.
31. STEWART AND PERCIVAL, *Physiol. Reviews*, 1928, **8**: 283; *Biochem. J.*, 1928, **22**: 548.
32. SUN AND MCOWAN, *Proc. Physiol. Soc.*, June 7, 1930.
33. TAYLOR, BRANION AND KAY, *Proc. Physiol. Soc.*, May 16, 1930.
34. VOLLMER AND SEREBRIJSKI, *Zeit. f. Kinderheilk.*, 1925, **39**: 655.
35. WALSH AND IVY, *Proc. Soc. Exper. Biol. & Med.*, 1927-28, **25**: 839.
36. WARNER, *The Lancet*, 1930, **1**: 339.
37. WATCHORN, *Biochem. J.*, 1930, **24**: 631.

DISCUSSION

PROF. V. H. K. MOORHOUSE (Winnipeg) discussed the mechanism of secretion by the parathyroids. To what stimuli is this secretion a response? There are nerve fibres along the course of the blood vessels, apparently autonomic, and probably arising from the cervical sympathetic. It still remains to be ascertained whether excitation of these will induce the secretion. The chemical excitors, if there be such, are unknown. Perhaps the level of blood calcium is the determinant factor.

The actual manifestation of tetany is characteristic of a nerve protoplasm disturbance. Excitation of nerve-muscle becomes increased about ten times over normal. It can be observed after section of the nerve and up to the time of its degeneration. The peripheral nerves are not the only sites of disturbance following parathyroidectomy. Chronaxie is lengthened, suggesting lowering of excitation, and this observation cannot at present be easily correlated.

There are sensory and afferent as well as motor disturbances. In dogs and cats intense irritation about mouth and nose is observable. The loss of appetite and vomiting seen in such animals following removal of the parathyroids probably are due to effects on the nerve centres in the mid-brain and medulla. There is a general involvement of the nervous system but different parts are unequally affected.

PROF. J. C. MEAKINS (Montreal) considered that the criterion of disturbance of parathyroid function is to be found in study of blood calcium and calcium balance, although the latter is open to many fallacies. There are six diseases associated with disturbance of calcium metabolism, parathyroid deficiency (spasmodic tetany), nephrosis, steatorrhœa with megalocolon, infantile rickets, osteomalacia, and generalized osteitis fibrosa (Von Recklinghausen's disease). Of these only two are associated with lesions of the parathyroid—parathyroid tetany, and its antithesis, generalized osteitis fibrosa. There has been considerable confusion in the study of the latter and of osteomalacia, and this must be borne in mind in utilizing the earlier literature. In nephrosis with a lowered calcium deficiency there is usually a good response to parathyroid therapy, although the cause and effect are not yet known.

DR. D. ROY MCCULLAGH (Cleveland) reported the results of a series of cases studied by himself and Dr. E. P. McCullagh exhibiting parathyroid deficiency following operation. They have endeavoured to find a means of controlling phosphate metabolism in this condition. They have observed that while many such cases exhibit a constant low level of serum calcium the patient's tetany symptoms vary from day to day, parallel with the inorganic phosphate in the serum. In normal sugar tolerance curves it is well recognized that as the blood sugar rises the phosphates show a fall (slightly delayed). In post-operative parathyroid tetany the relationship is somewhat emphasized. As the phosphate falls the neuromuscular excitability lessens. An attempt has been made to apply this finding to treatment. After a carbohydrate meal the symptoms are greatly, but only temporarily, relieved; calcium gluconate is ineffective, but administration of lactose has been found to give very beneficial results, these being accompanied by a slow steady fall of blood phosphates.

PROF. A. T. CAMERON (Winnipeg) referred to results he had obtained showing that the blood calcium of normal young rats is below normal, and at a level associated with tetany, for a large part of the year, although open tetany is never manifested. The explanation obviously seemed to be a dietary deficiency in vitamin D, and he reported results recently obtained by one of his students, Mr. C. F. Code, supporting this

view. In these animals the blood calcium can be maintained during winter at maximum or normal levels by feeding food irradiated from a carbon-arc lamp, or by adding irradiated ergosterol to the diet. Numerous observations by various workers have shown beyond doubt that marked over-dosage of the vitamin will markedly increase the plasma calcium. Since, however, over a considerable range of vitamine dosage the blood calcium remains constant, whereas any injection of the parathyroid secretion has its effect, the inference is reasonable that the main control over the height of blood calcium is exercised by the vitamin, perhaps through the parathyroids. The available evidence bearing on the effect of vitamin dosage and over-dosage following parathyroidectomy is quite conflicting, while little if any work seems to have been done to ascertain the result of continuous parathyroid injection in experimental rickets, and the speaker suggested that study of these problems might well throw much greater light on the whole problem of calcium metabolism.

THE CLINICAL ASPECT OF DISTURBANCES OF THE PARATHYROID GLAND*

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IT may be stated briefly that the function of the parathyroid glands is the maintenance of the calcium content of the blood plasma at a definite level and the control of the calcium balance of the body. It would also appear that these glands have an important function in regulating the calcium metabolism of the fixed tissues, particularly the osseous system.

For some twenty-five years the absence or deficiency of the parathyroid function has been identified with a lowering of the blood plasma calcium and the associated occurrence of increased electrical excitability of the neuro-muscular system, producing the well-known clinical picture of spasmodic tetany. But it has been only in comparatively recent years that clinical biochemical and pathological studies have enlarged our horizon and associated other abnormal conditions with disturbances of the parathyroid function. I think it may be taken that, theoretically, this function might be disturbed in one of three ways, as follows. There might be either: (1) a decrease in the normal function; (2) an increase in the normal function, or (3) a perversion of the normal function. So far as is known at the present time no such condition as would occur under the third category has been recognized as such. There are therefore left for consideration such conditions as might be identified under the first two sections. It might serve a useful purpose to consider at this time what conditions might be caused by a derangement of parathyroid function, and then determine if such an association is tenable on known facts.

On what basis or criterion may it be tentatively assumed that a disturbance of parathyroid function might exist? The function of the parathyroid has already been defined. There could therefore be no better tentative criterion than one which would indicate a disturbance of this normal function of calcium regulation. In the table are given the various disease conditions which are associated with a disturbance of the calcium metabolism. There has been included a record of the phosphorus content of the blood, as the calcium and phosphorus metabolism is so intimately associated that frequently it is impossible to interpret the significance of the first without a knowledge of the second. Of these six conditions there is definite knowledge that 1 and 6 ("parathyroid tetany" and osteitis fibrosa) are intimately connected with abnormal function of the parathyroid glands.

"Parathyroid tetany" is a condition which occurs subsequent to removal of the parathyroid glands or to their injury or degeneration from some other abnormal cause. It is characterized by increased mechanical or electrical excitability of the neuro-muscular system, with muscular hypertonicity leading to painful spasmodic contractions of the muscles of the limbs, trunk, and certain internal muscles such as those of the larynx, diaphragm, bladder, and bowel. There is also a pronounced decrease of the calcium content of the blood, which is usually in proportion to the degree of muscular irritability. There is little or no change in the *p*H of the plasma. This syndrome may be either per-

*A paper read in the Section of Bacteriology, Pathology, Physiology, and Biochemistry at the combined meeting of the British and Canadian Medical Associations, Winnipeg, August 28th, 1930.

No.	*Disease*	*Blood Calcium*	*Blood Phosphorus*	*Calcium Balance*	*Bony Changes*
1	"Parathyroid tetany"	Low	Normal or increased	Positive	None
2	Nephrosis	Low	Normal	Positive	None
3	Steatorrhœa with megalocolon (sprue, coeliac disease)	Low	Normal	?	None
4	Rickets—infantile	Low usually	Low sometimes	Relatively negative	Present
5	Osteomalacia	Decreased, normal, or increased	Variable	Negative	Present
6	Generalized osteitis fibrosa	High	Low	Negative	Present

manent or temporary. In the former case it may lead to a painful death unless corrected by the constant use of parathyroid extract. On the other hand, it may be but temporary, disappearing completely, or being latent with but mild and temporary manifestations. Tetany is a syndrome, however, which may occur with any condition where there is a low blood calcium, or even a normal blood calcium with a prolonged negative balance, provided the *p*H of the blood and its phosphorus content be not conspicuously lowered. Such conditions are to be found in steatorrhœa with megalocolon, infantile rickets, and osteomalacia, in all of which there is a low calcium content of the blood and either an absolute or a relative negative calcium balance. But the mere occurrence of tetany does not necessarily imply that the pathological condition is primarily due to a deficiency of parathyroid function. In fact there is no evidence, either experimental or clinical, to warrant such an assumption, except such as may be concluded from the fact that both in rickets and in steatorrhœa with megalocolon, or what is sometimes called "non-tropical sprue", the administration of parathyroid extract, with or without an abnormal increase of calcium in the diet, relieves the symptoms of tetany by raising the level of the blood calcium. There are, however, other means whereby this may be accomplished in rickets, although in non-tropical sprue the most efficient method of treatment is undoubtedly the use of parathyroid extract, not only in controlling the paroxysms of tetany, but also in ameliorating the intensity of the gastro-intestinal signs and symptoms. In fact, cases have been reported in which it would appear that a permanent cure had been effected by this means. In osteomalacia the effect of parathyroid therapy has not as yet been determined, but its close relationship to infantile rickets would appear to indicate that this form of therapy might be fruitful of beneficial results.

In the last five years a considerable interest has been aroused in the relationship between parathyroid tumours and diseases of the bone. In 1891 Recklinghausen described a generalized osteitis fibrosa, a disease which now bears his name. This pathological condition was more intensely studied by Askanazy in 1904. The first to draw attention to the association of parathyroid tumours and bone disease was Erdheim in 1907, in which connection he described a parathyroid tumour associated with osteomalacia. Hoffheinz in 1925, in a series of 45 cases with parathyroid tumours, either hyperplasia or adenoma, found 27 with diseases of the bone, 17 of which were classified as generalized osteitis fibrosa, 8 so-called osteomalacia, and 2 rickets. In the same year Mandl reported a similar case, and in 1927 Gold reported another. Mandl found a great increase in the calcium excretion, while Gold described an increase in the blood calcium. This subject has recently been reviewed by Hunter in his second Goulstonian Lecture. He here records that 14 carefully studied cases have been published up to date giving the clinical characteristics of hyperparathyroidism. These characteristics are briefly as follows. Whether the disease be due to a tumour, a hyperplasia of the parathyroids, or whether these glands be found normal histologically, the condition occurs twice as commonly in women as in men, and generally between the ages of 30 and 55. The patients complain of pains in the bones, and spontaneous fractures are common. Hypotonicity of the muscles is sometimes present, and radiograms show a greatly diminished density of the bone shadows, at times with evidence of cystic formation. There is an increased serum calcium, varying from 13 to 23 mg. per 100 c.cm., a reduction in the plasma phosphorus to between 1 and 2.7 mg., and in all cases there is an increase of the calcium output which may vary from a moderate degree to eight times the normal figure. It would appear, therefore, as if this condition were the opposite to that found in parathyroid tetany, except that there is the additional anatomical finding of pronounced bone destruction.

The superficial similarity of generalized osteitis

fibrosa and osteomalacia has led to considerable confusion in the study of this subject. Hunter brings forward arguments which would seem conclusive to warrant the opinion that these are entirely different diseases. Furthermore, the general course and the accessory clinical manifestations, such as tetany, which occur in osteomalacia, would make it much more likely that it is a disease more closely allied to infantile rickets than it is to the hyperparathyroid condition so intimately connected with generalized osteitis fibrosa.

Nephrosis is an interesting condition which would appear, in part at least, to be a disturbance of the permeability of the capillaries. This is manifested by an intense degree of albuminuria and generalized œdema. There are, in addition, two interesting disturbances of metabolism, one or other of which is usually present—namely, decreased basal oxygen consumption and/or a lowered blood calcium. The chief interest in this disease, which shows such pronounced renal factors, rests in the fact that a marked lowering of the blood calcium is present in a considerable number of cases, and that some of them respond most favourably to the use of parathyroid extract, not only in so far as the restitution of the blood calcium is concerned, but also in promoting a rapid disappearance of the generalized anasarca. As has been said concerning numbers 3, 4 and 5 in the table, so it may be said in regard to this disease, that although there be a disturbance of the calcium metabolism which may be rectified by parathyroid extract, there is no concrete evidence that the disease is primarily due to a deficiency of the parathyroid function. It is interesting to note in this instance that, although the serum calcium is reduced, there is never in these cases any suggestion of neuro-muscular hyperexcitability or tetany. The explanation is probably to be found in the tendency in these cases of the reaction of the blood to be towards a decreased *p*H.

In conclusion, we may state that, clinically, two conditions are identifiable with disturbed parathyroid function, the first being parathyroid tetany due to a hypoparathyroidism characterized by a low serum calcium, a positive calcium balance, and great hypertonicity and excitability of the neuro-muscular system. On the contrary, there is generalized osteitis fibrosa, a condition of hyperparathyroidism in which there is a high serum calcium, a negative calcium balance, and a tendency to hypotonicity and hypo-excitability of the neuro-muscular system, a pronounced rarefaction of the bones, and a resorption of the corticalis and original spongiosa, this being in striking distinction to the cessation of calcification characteristic of osteomalacia and rickets.

THE HOSPITAL, THE MEDICAL COLLEGE AND THE INTERNE.—A. C. Bachmeyer states that in many colleges, including the University of Cincinnati College of Medicine, the question of interneship is the subject of a formal lecture to the students early in the senior year. The limited time permits only a brief discussion of the situation. The requirements of the college, the organization of the hospital, the importance of its primary function, the place of the interne in its organization, the need for the observance of its rules and regulations, and the necessity for exercising discretion, good judgment and self-control are emphasized. Lists of hospitals approved for interneship by the American Medical Association and of those in which former internes have had service satisfactory to the college are published. In addition, there are personal interviews between the dean and other members of the faculty and the individual students. From these interviews, the dean or a selected member of the faculty may obtain an intimate insight into the student's plans and ambitions and be enabled to offer helpful advice or often to direct the student to the type of interneship best suited to his needs and instruct him how to proceed in order that his plans may be best accomplished. Before the University of Cincinnati adopted the fifth year requirement, all its students, for many years, had voluntarily served interneships of at least one year's duration. In recent years, however, an increasing number have planned to spend one or more additional years in clinical training. This desire is often developed in the course of the personal interview, and plans are formulated whereby such extended service may be obtained. Interneships are therefore in demand in those institutions in which the opportunities for advanced training are best developed. In return for the many educational advantages and opportunities, the hospital has a right to expect that the interne will conscientiously devote himself to his duties, even to those that are uninteresting or of a routine nature; that he will conduct himself as a gentleman and as a full-fledged physician; that he will fit into his important but relatively minor place in the hospital organization in an harmonious manner, do everything in his power for the good of the patients assigned to him and refrain from doing anything that will in any way interfere with the best interests of the patient or of the hospital. If the college, the hospital and the interne will develop this attitude toward the subject of interne service, a solution of the many vexing difficulties of which each of them often complains can be hoped for and every interneship can be expected to be of real educational value.—*J. Am. M. Ass.*, 1931, **96:** 1002.

"Ignorance is the necessary condition, I do not say of happiness, but of life itself. If we knew everything we could not endure existence a single hour. The sentiments that make it sweet to us, or at any rate tolerable, spring from a falsehood, and are fed on illusions."—Anatole France.

THE INTERRELATIONSHIP OF NON-TUBERCULOUS UPPER AND LOWER RESPIRATORY DISEASE*

BY JABEZ H. ELLIOTT, M.B.,

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MY part in this discussion would appear to be to deal with those diseases of the lungs and bronchial tree which are secondary to, or affected by, disease or altered function in the upper respiratory passages. It is difficult to classify the various methods by which disease in the upper respiratory tract leads to disease in the lower. The relationship appears clear in such cases as acute rhinitis, where the infection spreads rapidly, or at times slowly, downward, with successively a pharyngitis, a laryngitis, a tracheitis, at times a bronchitis, a bronchiolitis or a pneumonia. Nasal obstruction, from any cause, leading to mouth breathing, results in the aspiration into the bronchial tree of air insufficiently warmed or filtered, and of relatively low humidity. This causes a hyperæmia of the bronchial mucosa, with increased secretion and the symptoms of a subacute bronchitis. We have to consider, too, the aspiration of septic material into the bronchial tree from the upper passages, whether this be secretion from post-nasal and oral dripping, or infected material dislodged during the course of some operation in the oro-nasal cavities. Spread may also occur to the lungs through the blood and lymph streams, explaining some of the cases of pulmonary abscess which follow oro-nasal sepsis.

THE LUNG PARENCHYMA

Lobar pneumonia.—I shall not dwell on the relation here. The study of a large series of cases in various hospitals reveals that over 50 per cent have had a cold or sore throat for several days to two weeks before the onset of the pneumonia.

Pulmonary abscess.—This is a frequent result of oro-nasal sepsis. Some five years ago I reported on 47 consecutive cases of pulmonary abscess. Thirty-two of these followed operations within the oro-nasal cavities. I have seen two others follow a quinsy not operated upon. Lord, in an analysis of 227 cases, found abscess a sequel to tonsillectomy in 34.3 per cent of the cases.

Asthma.—When we place in one group those cases of allergic asthma due to pollens, feathers and other epidermals, and food, there is still a large group in which no definite sensitiveness to protein can be demonstrated. A large proportion of this group will be found to have associated nasal disease. Clendenning says that in 100 cases of bronchial asthma which did not respond to any skin test for hypersensitiveness 97 per cent had nasal disease of long standing. This seems a very high proportion, but it cannot be far from the truth. That the removal of hypertrophies and the draining of infected sinuses does not cure the asthma does not disprove the etiological relationship, for in many cases of long standing there are secondary foci of infection in the bronchial tree. Further, the laryngologist may fail in clearing up a long standing infection with a degree of pan-sinusitis. The association of nasal polypi with asthma has been known for a long time. The removal of polypi has given at times brilliant results. In many cases the operation fails to give relief. We know now that polypi in the ethmoid region usually represent a chronic ethmoiditis; their removal may allow sufficient drainage to relieve the asthma, but in many cases a radical curetting of the ethmoid cells is necessary to clear up the focus. If of long standing the sphenoidal cells may be also involved. The asthma will not be relieved if a focus persists. We have seen long standing cases of asthma relieved by draining an empyema of an antrum, and by cure of an ethmoiditis. Persistent search and thorough treatment by the rhinologist are essential in troublesome cases.

* Read at the Academy of Medicine, Toronto, November 11, 1930, before the combined Sections of Medicine and Oto-laryngology.

CASE 1

Miss H.—Subject to chronic cough; severe asthma at long intervals during the past three years. She was a mouth-breather at night, having much nasal secretion, and using many handkerchiefs each day. There was chronic nasal infection. With relief of the nasal infection the cough disappeared.

CASE 2

Miss M.—Recurring colds for ten years, with nocturnal orthopnea relieved only by adrenalin; much morning mucoid sputum. Asthmatic symptoms developed at night only. The left antrum was found to be dark on transillumination. She was referred to Dr. S. L. Alexander, who reported empyema of the left antrum and chronic ethmoiditis. Treatment of the sinus infection gave complete relief.

CASE 3

M. B.—Severe cough for 18 months with periods of asthma, principally nocturnal, but often severe in the day time as well. He had frequent attacks when he had to go to bed for two or three weeks. He had lost 20 pounds. The right antrum was opaque; the tonsils were both enlarged and pus present. He used six handkerchiefs a day. Washing out the antrum gave some relief; reduction of hypertrophies gave further relief; and removal of tonsils gave complete relief.

CASE 4

M. H.—For six years had had chronic bronchitis with asthmatic attacks. Tuberculosis was suspected. Examination revealed an empyema of the left antrum. This was treated by Dr. George Biggs, giving complete relief of symptoms, and the patient has had no recurrence of symptoms.

Recurring bronchitis.—We see many cases of recurring or chronic bronchitis. Wheezing may be complained of at times; occasionally there are mild attacks like asthma. Physical examination may reveal nothing on auscultation. Some cases may show rhonchi or scattered piping râles; some may show localized râles as if from a localized bronchitis or a small area of bronchopneumonia. In the more severe cases of the latter type bronchiectasis may develop. In this large group of cases chronic nasal infection is a common source of the infection. Chronic oronasal infection is particularly associated with the localized type, and particularly those with lower lobe infections.

CASE 5

Mrs. G.—Seen with Dr. J. C. Maynard, February 19, 1927. From 1924 to 1927 she had had recurring bronchial colds; had influenza in November, with bronchopneumonia. The cough persisted. She was in bed five weeks, with three weeks of slight fever. At time of examination she had a loose mucous cough; the temperature had recently been 102°, with pain in right base. The sputum was blood-stained or brownish at times. Examination revealed an area at the right base, with numerous fine râles and very slight impairment of resonance. When seen two weeks later, her temperature had been 99.4 to 99° daily; the sputum persisting, but less. She was having occasional asthmatic attacks. The tonsils looked unhealthy. The temperature gradually became normal but the cough persisted. Some time later the tonsils were enucleated. The chest symptoms rapidly disappeared and have not recurred.

CASE 6

Margaret M.—Gave a history of frequent colds with bronchitis since childhood. Her general health was good and she was well nourished. The attacks were not severe but frequent. She often had to give up her teaching for a day or two. Tuberculosis was suspected, but examination revealed no evidence of disease within the chest. There were polypi high up in the nasal passages. Dr. J. X. Robert reported chronic ethmoiditis.

CASE 7

C. B.—Aged 19, was examined by the medical officer of one of our banks and "turned down" on account of "chest". He had frequent dry cough for two or three years. He was thin, weighing 130 pounds; height, 5 feet 10 inches. Examination revealed inconstant râles in lower lobes, suggesting bronchitis, but there was no evidence of pulmonary disease. The tonsils were unhealthy, and exuded pus on pressure.

Tonsillectomy was advised, and an operation was performed by Dr. J. X. Robert. The cough soon disappeared and no râles were heard on examination. His condition was quite relieved.

CASE 8

Miss F. P. had had a cough since childhood. The sputum was mucoid, at times muco-purulent. She gave a history of pleurisy with effusion in 1928, when she was seven months off work. Sputum was more abundant in damp weather, mostly in mornings; some nasal discharge in damp weather. Examination of the chest revealed a few small râles in left infrascapular area. By transillumination both antra were opaque. She was referred to Dr. S. L. Alexander, who reported pus in both right and left antrums. Treatment and adequate drainage resulted in complete disappearance of the chronic cough.

CASE 9

H. C. S.—Had had bronchopneumonia in October and November, 1928, and was in the house for five weeks. He had had a cold and cough for two or three weeks previously, followed by a chill and acute onset of the bronchopneumonia. Cough and sputum persisted to the end of February, when he was referred to me for examination as possibly tuberculous. Examination of the chest was negative, but polypi were seen in the region of the right superior turbinate. He was referred to Dr. G. Boyd, who reported ethmoiditis present. The polypi were removed and the sinus drained. The chest symptoms gradually disappeared.

Bronchiectasis.—Clendenning has made the rather startling statement that in 150 cases of bronchiectasis, varying in severity, all were associated with long standing nasal infection. In our cases of bronchiectasis we have found a great many with sinus infection. So prevalent is this association that we feel it necessary to request a rhinological examination as a routine measure. Bronchiectasis develops not infrequently in childhood following measles and whooping cough, doubtless from a destructive process taking place in the bronchial mucosa

and deeper structures in the course of a complicating bronchopneumonia. Whether a sinus infection is present and determines the bronchopneumonia, or whether it is a simultaneous infection, we do not know, but the frequency of their association is striking. Knowing this fact, I think it would be a wise measure to have an examination of the nasal passages and sinuses in all cases of the bronchopneumonia of measles and whooping cough. In most of our cases of bronchiectasis we have been able to demonstrate an associated sinusitis, and the history of nasal infection or symptoms is always of long standing, as if bearing an etiological relationship. In the cases of putrid bronchiectasis and of pulmonary abscess we find that mouth organisms, such as spirochætes, are present, suggesting that this added infection is carried from the oral cavity. The fact that foul bronchiectasis and pulmonary abscess are more frequent among the poor than the well-to-do has been explained on the basis of the greater frequency of oral sepsis in the poor and the unhygienic.

In the discussion of bronchitis I have related a few cases who came, or were referred, for examination because of suspected tuberculosis or to exclude tuberculosis. In my work dealing with internal medicine and more particularly with pulmonary disease I see many patients who have persistent cough, often associated with debility and loss of weight, and others troubled with the clearing of mucus from the throat, at times blood stained, occasionally with pain in the chest and other symptoms related to the lung. In these cases pulmonary tuberculosis is naturally suggested. Where pulmonary disease can be ruled out chronic oro-nasal infection is often the cause of the symptoms, and must be recognized and treated to relieve the chest symptoms.

On the other hand, chronic tonsillitis, hypertrophic and atrophic conditions in the nasal passages, and sinus infections are also found in those who have tuberculous lesions in the chest but not so frequently. If there is real reason to suspect tuberculosis do not let the finding of chronic oro-nasal infections rule out tuberculosis. Tuberculosis must be ruled out by exploration of the chest by all the means at our command, on the history, on the radiological, laboratory and clinical tests. In the non-tuberculous lesions the nasal infection is often the primary one and its treatment is essential in cure. In the tuberculous it is an associated condition, not the primary one, and its treatment must be secondary always to the treatment of the tuberculous lesion. The symptoms of tuberculosis are often aggravated by such infections of the upper respiratory tract.

CONCLUSIONS

Chronic bronchitis is a symptom rather than a disease. If tuberculosis is excluded there should be a thorough examination of the nose and throat and sinuses.

In asthma if the patient does not respond to tests for pollen, food and the epidermals, oro-nasal infections including teeth, tonsils and sinuses will be found responsible in a large percentage of cases. The search must be thorough.

In pneumonia, tuberculosis, bronchiectasis, abscess, the condition is often made worse by an oro-nasal sepsis.

The presence of upper respiratory infection at times masks a pulmonary tuberculosis and causes the physician to overlook the more serious disease in the lower respiratory tract.

Conversely, the symptoms set up by oro-nasal sepsis often simulate tuberculosis.

In bronchiectasis always make a thorough examination for oro-nasal infection.

Fully one-third or more of the cases of pulmonary abscess seen in hospital follow tonsillectomy.

Laryngotracheo-bronchitis may be caused, aggravated or rendered chronic by nasal obstruction and nasal sepsis.

The bacterial flora of cavities in the lung, tuberculous, bronchiectatic or abscess cavities resembles the mouth flora, and the infection probably descends from the mouth.

The nose requires a careful examination in all inflammatory conditions of the lower respiratory tract.

The laryngologist should have the lower respiratory tract investigated in all cases of upper respiratory infection when chest symptoms are present.

STERILITY*

A CONSIDERATION OF IMPORTANT FACTORS IN THE DIAGNOSIS AND TREATMENT

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INTEREST in the study of sterility has been greatly stimulated in recent years by the development of certain diagnostic procedures and by a better understanding of the endocrine system and its relation to sterility. These newer methods, which are now being more or less generally used, have increased our knowledge of the causes of sterility, have given means for making more accurate diagnosis and have made treatment more successful. I refer to: (1) improved methods for estimating fertility in the male; (2) postcoital examination; (3) determination of tubal patency by the Rubin method of insufflation and injection of the tubes with opaque substances, such as, lipiodol.

BASIC REQUISITES FOR FERTILITY

There are certain basic requisites for fertility which may be summarized as follows: The testes must produce normal spermatozoa. The spermatozoa must be able to pass through the male genital tract undamaged. Vaginal and endocervical secretions must be favourable to spermatozoa deposited in the vagina at ejaculation. The cervix, uterus and tubes must allow the upward migration of spermatozoa and descent of the ovum. The ovaries must produce normal ova. The endometrium must be healthy to allow successful embedding and development of the ovum.

If any of these requisities fail sterility will result. We now have more or less satisfactory means to determine whether each of these factors is favourable for conception. A study to determine the cause for a sterile marriage should begin with a search for certain known conditions which may effect either the husband or wife and predispose to or cause sterility. I refer to subnormal constitutional conditions, and to underdevelopment, abnormal function or acquired abnormalities of the generative organs. A complete medical history and physical examination of both husband and wife are indispensable in detecting the existence of these conditions and should constitute the first step in the investigation.

RELATION OF SUBNORMAL CONSTITUTIONAL CONDITIONS TO STERILITY

There is considerable evidence to support the belief that sex cells, the most highly differentiated cells of the body, are the first to suffer from subnormal constitutional conditions. The influence of the general health on the function of the generative organs is apparently much greater in some individuals than in others. However, poor hygiene, over-fatigue, sexual excess, errors in diet, lack of exercise, anæmia and chronic intoxications must not be overlooked in either partner as possible causes for the sterility. As a result of these conditions in the male specimens of semen are at times found to have fewer spermatozoa, a higher percentage of immature forms, and spermatozoa of poor vitality. In the female, menstruation may become scant, irregular, or may fail to appear. Ovulation may cease, or ova of poor quality may be produced, which either cannot be fertilized or fail to develop to maturity when they are.

Study of the general health of a sterile couple should include an analysis of diet. From experimental work with animals and also from observations on human beings it seems certain that sterility or low fertility may result from diets deficient in protein, certain vitamins, especially A, B and E, and mineral salts, such as calcium.

* A paper read at the annual meeting of the Ontario Medical Association, Toronto, May, 1930.

RELATION OF THE ENDOCRINE SYSTEM TO STERILITY

Although there is yet much to be learned regarding the endocrine system, there can be no doubt that normal development of the generative organs depends on a well balanced physiological function of the glands of internal secretion. Details in the personal history and general physical make-up of an individual often suggest the type of an existing endocrine disturbance, which may also have influenced the development of the sex organs or may be causing abnormalities of their function. On the other hand, it is admitted that general bodily development may be quite normal and the sex organs much underdeveloped.

Although the male sex organs may be underdeveloped, the incidence of gross and obvious defects causing sterility is small. However, it is now believed that a hypoplasia of the seminiferous tubules may occur from lack of development, which results in low fertility or sterility, and explains persistent seminal defects in certain cases.

In women who are sterile obvious faults in development and function of the generative organs, the result of endocrine disturbances, are not infrequent. Endocrine failure early in life may occasionally cause infantilism of the generative organs, but not infrequently do later endocrine disturbances result in all degrees of arrested development, such as are manifested by; the shallow funnel-shaped vagina with practically no seminal pool about the cervix, making intercourse difficult and insemination unsuccessful; the long conical cervix with stenosis of its canal, frequently an obstruction to upward migration of spermatozoa; a small, undeveloped, anteflexed, retrocessed uterus which turns the cervix forward out of the seminal pool and fails to provide normal conditions for imbedding and development of the fertilized ovum; arrested development of the Fallopian tubes which may be long, convoluted and occluded; imperfect development of the ovaries, as a result of which the ova produced are few and defective.

After puberty, a disturbance in function, especially of the pituitary body, the thyroid gland and the ovaries may lead to abnormal menstruation, low fertility, sterility and spontaneous interruption of pregnancy in the early months. From his studies Litzenberg concludes that more than one-half of sterile women have a basal metabolism below normal. From my experience I believe that fluctuations in basal metabolism which are frequently considered within normal limits must not be overlooked as an index of the possible cause for sterility. I have found that pregnancy not infrequently occurs after correction of even slight degrees of hypothyroidism.

Endocrine failure causing sterility is frequently a combined disturbance in the internal secretions of the pituitary, thyroid and ovaries. Meaker states that the primary focus of failure is six times in the anterior lobe of the pituitary, and three times in the thyroid to once in the internally secreting portion of the ovary. For thyroid deficiencies we fortunately have potent extracts which give consistent results. The therapeutic results from pituitary extracts are as yet variable and unreliable, but in some cases appear to be effective and beneficial.

In 1925 a substance called "female sex hormone" was almost simultaneously recovered from the blood by Loewe, of Dorpat, and Frank and Goldberger, of New York. Soon after this Loewe discovered the same substance in the urine. In 1912 Iscovesco first made placental extracts of the same substance. In the meantime Frank and Goldberger have continued their investigations with the sex hormone in the blood. Allen and Doisy have worked with the urine, and produced ovarian hormone in crystalline form. Recently Collip, at McGill University, has prepared a placental extract for oral administration which is reported to be effective. Although all this work is still in the experimental stage, it has encouraged us to believe that we may soon have potent physiological hormonal extracts which will give uniform results when used to stimulate ovarian function.

In certain patients the ovarian glandular preparations which are available fail to give any response. Stimulating doses of x-ray applied to the hypophysis and ovaries may be effective in these cases. Rubin has reported on a series of patients treated by this means for scanty and delayed periods. The menstrual periodicity was restored to normal in 80 to 90 per cent of those treated, and fertility of the group was increased 50 per cent.

ACQUIRED ABNORMALITIES OF THE GENERATIVE ORGANS IN STERILITY

Of the acquired physical abnormalities of the generative organs causing sterility those arising from infection are the most frequent and important in both sexes. In the female we have also uterine displacements, neoplasms of the pelvic organs, and childbirth injuries, which may be factors. It is assumed that the character of these conditions is too well known to need discussion.

Briefly stated, acquired physical abnormalities of the generative organs may render either sex sterile by causing conditions which result in: mechanical obstruction to the normal passage of germ cells through the generative tracts; formation of toxic substances which have a destructive action on the reproductive cells; interference with the production of germ cells. Relief of the sterility depends on the success of efforts to correct the existing pathological condition, whether it be by palliative or surgical means.

DIAGNOSTIC METHODS

The final opinion as to whether conditions are favourable for conception requires evidence of male fertility, and proof that conditions do not exist within the female which might interfere with fertilization of the ovum.

It is agreed that 30 per cent of sterile marriages are due to defects in the male. The most recent studies of male fertility have been aimed not only at developing exact methods for establishing the fact that a man is fertile but also at estimating the degree of fertility. These studies have made possible an actual count of the number of spermatozoa per unit of semen, a morphological examination of the spermatozoa, and an estimate of the output of mature well developed germ cells, and finally an opinion as to the vitality of the germ cells. Vitality of the cells is judged by how well the motility is sustained in condom specimens, and under normal conditions in the vagina and cervix, as observed in specimens taken at the post-coital examination. These diagnostic procedures will become more useful when the technique has been simplified. However, results of these studies emphasize three essential requirements for a high degree of fertility as follows:—the output of a large number of spermatozoa; a high percentage of germ cells put out must be mature and well developed; spermatozoa put out must show good vitality, as indicated by well sustained motility especially in the vagina and cervix under normal conditions.

Examination of a condom specimen of semen should give the first opinion as to whether the husband is producing a normal number of mature spermatozoa of good motility. The specimen should be kept as nearly as possible at body temperature and examined within one hour after intercourse.

The post-coital examination, as devised by Hühner, is one of the most valuable diagnostic methods which we have to determine the cause for a sterile marriage. The examination of the woman should be made within one hour after she has had intercourse, and is likely to be more satisfactory if she rests in the recumbent position for a short time afterwards. She is advised to apply a sanitary napkin snugly before making the trip to the office. She is examined in the usual dorsal position with a slightly warmed bivalve speculum. Normally, the quantity of secretion in the seminal pool varies from 15 to 40 minims and is alkaline in reaction to litmus paper. Motility of spermatozoa is diminished or suspended if the vaginal secretions have rendered the pool acid in reaction. A microscopical examination of a specimen from the vaginal pool should be made to again observe the number, maturity, and motility of the spermatozoa present. The final step in the post-coital examination is a study of specimens taken from the cervical canal at various levels up to the internal os. Usually three or four specimens are taken with suitable pipettes. Under normal conditions these specimens show decreasing numbers of mature, actively motile spermatozoa in transparent glistening mucus as the internal os is approached.

Sterility is not infrequently caused by a thick, tenacious, mucopurulent, endocervical discharge, the result of infection which exerts a destructive action on spermatozoa, or forms a barrier to their upward migration. Post-coital examination may demonstrate the necessity for correction of excessive vaginal acidity, or elimination of an abnormal cervical discharge in order to relieve the sterility. Having found mature, actively motile, spermatozoa in the cervical canal we can be reasonably certain that the husband is not responsible for the sterility.

In a recent article Cary gives his experience with post-coital examination, and states that he believes that this kind of examination is essential, if not the most important, single diagnostic procedure in the study of sterility. In his experience the major cause for sterility was demonstrable by post-coital examination in 48 per cent of the patients examined. At a post-coital examination the finding of actively motile spermatozoa in the cervical canal is our best means of proving that insemination has been successful.

Having found actively motile spermatozoa at the internal os of the cervix we may assume that conditions are normal for the first step in the upward migration of spermatozoa. After passing through the cervical canal conditions apparently always become more favourable for the existence of the male germ cells. Under normal conditions spermatozoa are found alive and motile for from one to two hours in the vagina, and, at times, for from three to four hours in the cervix. They have been recovered, alive and motile, from the uterine cavity five or six days after intercourse, and from the tubes nearly a month after recorded intercourse. Conditions in the uterine cavity rarely act as a barrier to the upward migration of germ cells.

Determination of normal tubal patency is the last step in proving that there are no obstacles to the upward migration of spermatozoa or the descent of the ovum. Obstruction of the Fallopian tubes may result from practically any gynæcological condition which involves the abdominal female generative organs. In other words, occlusion may result from under-development or infection of the tubes, uterine displacements, neoplasms, of the ovaries or uterus, and from functional disturbances of the sex organs. Tubal spasm as the possible cause of occlusion must always be considered. It can best be ruled out as the cause for obstruction if the patency of tubes which seem occluded is again determined after the patient has been given full doses of antispasmodic drugs such as belladonna or its derivatives. In a sterility clinic at the Women's Mospital we have done over three thousand insufflations by the Rubin method, using carbon dioxide gas, without any alarming symptoms in any patient.

We feel that the method is indispensable in the study of sterility, and that it is a safe diagnostic procedure if done with suitable apparatus and in properly selected cases. It is contraindicated in patients who are bleeding, and in those with active infections of the generative organs. It should be used with caution in patients who are extremely nervous and in those with organic heart disease. The most suitable time to test the patency of the tubes is about one week after the completion of a menstrual period. For the patient's safety and comfort carbon dioxide gas should be used for insufflation. For the examination it is also absolutely essential to use an apparatus by means of which it is possible to determine the rate of flow of the gas, the volume of gas used, and to register constantly intra-uterine pressure. From 150 to 250 c.c. of gas are used at an examination. Intrauterine pressure is never allowed to exceed 200 mm. In a small percentage of patients tubal obstruction is relieved by insufflation and the patient may quite promptly conceive.

Determination of tubal patency by injection of opaque substances, combined with x-ray, has a more limited field in practice. Its greatest value is in cases in which the tubes have been proved to be occluded by gas insufflation and it is proposed to relieve the obstruction by surgical means. Methods for testing tubal patency have also given us a procedure for checking the result of salpingostomy. Under the most favourable conditions operative results are disappointing. If the obstruction is in the proximal end of the tube attempts to open the lumen almost invariably fail. Polak states that if the obstruction is at the fimbrial end and the tubal wall is not infiltrated, we can expect a satisfactory result in only 8 per cent of cases operated on. In view of these facts it is most important to determine the point of obstruction before advising or attempting operation to relieve tubal obstruction.

The remaining step is to determine whether a patient ovulates. Conditions which interfere with ovulation have long been known. For instance, the ovaries may fail to produce ova, owing to hypoplasia from faulty development or depressed function from endocrine failure. A thickened tunica albuginea may also prevent the mature follicles from rupturing and expelling the ovum. Morau and Lataste have found

that the sex cycle in the lower animals can be accurately followed by a study of vaginal smears. Ovulation is accompanied by the desquamation of typical cells from the vaginal walls. The application of this procedure to the human female has been found more difficult. However, the results of an extensive study by Stockard and Papinicolau on ovulation at the Woman's Hospital and the Cornell Medical College, applying this method so valuable in lower animals, are soon to be published. We are assured that results of this study will give us a method whereby we shall be able to determine whether and when a women ovulates.

It is believed that the ovum is usually fertilized in the outer third of the tube. If the tubes have been found freely patent it is assumed that descent of the fertilized ovum to the uterine cavity is possible.

If the uterus is well developed, in normal position, free from neoplasms, and menstruation is normal we may conclude that conditions within the uterus are favourable for the ovum to be imbedded and to develop, and that the uterus is not at fault in the failure to conceive.

It has always been of interest to know why the partners in certain sterile marriages, when remarried to other partners are found to be fertile. We no longer need attribute this to some strange biological incompatibility. It has been proved that this invariably means that both of the original partners had such low grade fertility that a sterile marriage was the result. If either of the partners in such a sterile marriage is subsequently mated with a partner of normal fertility conception may occur quite promptly.

In making an investigation to determine the cause of a sterile marriage we must never forget that there may be more than one important existing cause. If our treatment is to be logical and successful we must first make a thorough systematic investigation of every possible cause. Another writer on this subject has aptly said that "to accept the first discovered abnormality as the cause of the sterility leads to therapeutic blunders." For instance, the wives of sterile husbands are still being subjected to dangerous, useless, gynæcological operative procedures, aimed at the cure of sterility, without the husbands ever having been suspected or examined to determine whether they were fertile.

CONCLUSIONS

1. Success in the treatment of sterility depends on a systematic investigation of every possible known cause.

2. The influence of constitutional factors in the causation of low fertility and sterility is not sufficiently appreciated.

3. The fertility of the male should never be taken for granted. In our investigation we cannot afford to overlook the source of approximately 30 per cent of the causes for a sterile marriage.

4. Success in the treatment of sterility requires a knowledge of the endocrine system and metabolism and their relation to conception.

5. We have at our command means for more or less satisfactorily checking each of the physiological processes involved in the production of germ cells, and the fertilization of the ovum.

A NEW STIGMA OF CONGENITAL SYPHILIS.—G. K. Higoumenakis, over a year ago, noticed that the sternal end of the right clavicle was enlarged in many patients in whom congenital syphilis was suspected, so he began to examine the patients of the polyclinic systematically for this sign. The sign was found frequently among 1,500 patients examined, but there were 23 cases in which it was absolutely characteristic and beyond doubt. In 7 of these cases there were other positive stigmata, and the Wassermann reaction was positive. In the other 16 cases the Wassermann was negative, which happens frequently in congenital syphilis, but there were other stigmata of congenital syphilis. These 16 cases are described, and the associated stigmata in each case given. The cases show that enlargement of the sternal end of the right clavicle is as definite a sign of congenital syphilis as the other known stigmata, and it occurs more frequently than the others. It is never found in normal individuals or patients with acquired syphilis. The sternal ends of both clavicles consist of connective tissue that is soon transformed into bone tissue, and not of cartilage like the outer two-thirds of the clavicle and the rest of the bones of the skeleton. The spirochetes settle in lymphatic regions and in connective tissue. On movement of the arm, particularly the arm that is most used, there is constant irritation of the sternal end of the clavicle, and the spirochetes that have settled there are activated by the chronic irritation, causing a chronic periostitis. In 13 cases in which the patients had enlargement of the sternal end of the left clavicle, all were left-handed. The enlargement of the end of the clavicle is not caused merely by use, as otherwise it would occur in all right-handed individuals. It does not occur unless there are spirochetes present.—*Deutsche Ztschr. f. Nervenh.*, 1930, **114**: 288.

THE TREATMENT OF ENURESIS IN HOSPITAL PRACTICE*

BY S. J. USHER, M.D.,

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CHILDREN with enuresis have always been a problem with the medical man. The temptation has been to treat these cases in a routine manner by limiting fluids and prescribing Tr. Belladonnæ. Results by this method in the past have been very slow and uncertain, relying as one did almost entirely on the complete and prolonged cooperation of the mother and child. This cooperation can usually be obtained in private practice, but it is much more difficult in the type of patient one sees in the dispensary of any large city hospital. It was this consideration which prompted us to try other methods.

In an attempt to obtain a quicker response to treatment by simple psychic means a study of 48 cases has been made. These were taken chiefly from the dispensary of the Children's Memorial Hospital and the Pædiatric Out-Door of the Montreal General Hospital. Among these 48 cases were 30 boys and 18 girls, whose ages at their first attendances varied from 2½ years to 13 years. There were 20 children of 5 years and under; 13 between 6 and 8 years; and 15 of 9 years and over. In the majority of cases the enuresis dated from infancy. There were three families in which more than one child was a bed-wetter. Seventeen children wet day and night and 31 only at night. In only 6 cases could a definite history of an antecedent infection be elicited.

A complete physical examination was made of each child. The majority showed varying degrees of general debility and poor nutrition, and were, on the whole, nervous and unstable children. In Horton's[1] series of 60 cases, 66 per cent were found to be nervously unstable children, but bright and responsive; 23 per cent were shy and phlegmatic, making contact with them more difficult; 10 per cent were unstable, unresponsive, children or of poor mental ability. Definite incompatibility with the home or the mother was found in 35 per cent of all the cases. In Bleyer's[2] series 25 per cent seemed to show nervous instability. Routine examination of the urine was made in each case of our series. In the majority no abnormality of any kind was detected. In only 4 cases could we find a definite organic or physical basis for the enuresis. The first was a girl of seven years with a chronic pyelitis; the second, a girl of nine years with chronic sinusitis and bronchitis, and a history of pyelitis; the third, a girl of four and a half years with chronic nephritis; and the fourth a boy of twelve with chronic hydrocephalus and subnormal mentality. We did not include these cases in our series.

The majority of cases of enuresis are undoubtedly the result of bad habits. These bad habits may be due to lack of proper training or to over stimulation of the nervous system, or both. Holt[3] believes that in most cases the condition is purely a habit, often associated with other habits which indicate an unstable or highly susceptible nervous system. Grover[4] states that enuresis is symptomatic of an underlying general neuromuscular fatigue. He obtained good results with treatment along dietary and hygienic lines, with limitation of fluids, and the establishment of earlier hours for micturition. Wooley,[5] from her experience with children at the Merrill Palmer School, Detroit, states that the most common failures in developing correct habits about the use of the toilet have to do with the age at which training is undertaken and with the emotional atmosphere that surrounds the training. She lists them as follows: postponing the period of training beyond the natural time for it; conducting the training in such a spirit that the child's antagonism is aroused; making the bad habit the occasion for emotional scenes of an exciting kind; using such severe methods of training that he develops a fear of wetting, which is in itself enough to make him do it; the failure resulting from undue emotional depen-

* From the Children's Memorial Hospital and the Pædiatric Division of the Montreal General Hospital.

Read before the Pædiatric Section of the Canadian Medical Association, Montreal, June, 1929, and brought up to date by the addition of 16 cases.

dence upon the mother. In training the child the stress should always be put upon pleasure in success and never upon disapproval for failure. In many instances, the child whose sense of responsibility about bed-wetting must be aroused is also in need of it in other directions. According to Thom[6] much of the day wetting is found in the active, excitable youngster who is so engrossed with the outside world that he is hardly aware of the calls of nature. Such must learn by experience that wetting their clothes is not a paying proposition. Being kept by themselves after an accident, without companionship, works wonders in a short time with this group.

In the treatment of our cases everything is made as simple as possible. With this end in view a typewritten sheet of directions is given to the mother (see Table I). She is directed to

TABLE I

DIRECTIONS TO MOTHER FOR BED-WETTING

STOP all punishments or action that will arouse fear in connection with the habit.

STOP shaming.

STOP all arguing and rowing and dominating unreasonably.

STOP all display of emotional concern and substitute an indifferent attitude. Treat mishaps in a casual and kindly way, so as not to concentrate the child's mind on the failures and difficulties.

STIMULATE interest in success by much praise and rewards for dry nights—avoid mention of wet nights. Never express a lack of faith in the child.

KEEP a gold star calendar of dry nights only.

STOP "babying" by over-affection, etc.

NEVER mention to the child that he has "weak kidneys," etc., or that he will in after years outgrow the habit.

GENERAL RULES

1. Restrict fluid (milk, water, soup, etc.) after 4.00 p.m. The evening meal should be light and dry, *i.e.*, cereal or custard or junket, bread or jello, fruit, etc. Avoid coffee, tea, salt, pepper and condiments at all meals. Especially avoid salt and sweets after 4.00 p.m., as these increase thirst.
2. Empty the bladder before retiring, and again at 10.00 or 11.00 p.m. Be certain that the child urinates freely at these times.
3. Rest; an afternoon nap if possible; no excitement or high tension after 5.00 p.m., such as exercise, reciting, competitive games, loud laughter, movies or exciting radio programs. The child should sit down and play quietly after 5.00 p.m. and retire early. Elevating the foot of the bed six inches is helpful.

stop all punishment, shaming, arguing and all emotional displays; to stimulate in the child a confidence in its power to control the condition. Rewards are emphasized rather than punishment. The usual restrictions of diet and liquid are imposed. Rest and avoidance of excitement are particularly emphasized. The child is required to empty the bladder on retiring and again at 10 or 11 p.m. Awakening the child at other times during the night seems rather to fix the habit than correct it. Similarly, interrupted urination during the day for the purpose of training, causes the child to concentrate on his difficulties.

It is wise to find out about what time urination is apt to occur for the first time during the night and then attempt to forestall it. The child should be thoroughly awakened and made to attend to his own toilet needs. Wooley[5] suggests that the child who wets his clothes or his bed should be made to take the responsibility of changing the bed or the clothes, and of washing his clothes or his sheets. No emotional upsets should accompany this demand. After the young child has been trained to waken himself at night it is often wise to place a little chamber by his bed so that he can get up and use it easily.

In addition to these general directions, each child is given a hypodermic injection of 1 c.c. of sterile distilled water once a week, and is assured that this treatment will result in a cure. He is warned, however, that should a relapse occur additional injections will be administered. This method of treatment was prescribed by Friedell[7] in an attempt to test out the widely prevalent opinion that true enuresis is psychogenic in origin and frequently responds to psychic treatment. He obtained a prompt cure in from one to three injections in 29 out of 39 children. These cases had a greater concentration of urine at night than during the day. Greater difficulty was encountered in 5 cases where the specific gravity of the urine during the day was equal to or slightly greater than the concentration occurring at night. A complete failure occurred in 3 cases where the specific gravity was persistently and definitely higher during the day than during the night. The total percentage of cures was 87. Night and day urines could only be obtained in 17 of our cases and these showed a definite reversal of concentration in four and practical equality in two. No relation could be found in this series between the specific gravity and the ease or difficulty with which improvement or cure of the enuresis could be obtained. Two of

the cases with reversal of concentration showed a rapid cure, one with two and the other with three injections, and the other two cases showed no improvement.

Other forms of injection treatment have been tried. Blau[8] reported good results from solution of pituitary given hypodermically and orally. Kovats[9] reported success in treating patients with injections of tuberculin. Mueller,[10] on excluding suggestion from his series, could not obtain the good results reported by Kovats, thus showing that suggestion was a great therapeutic factor. Various other forms of psychic therapy have been tried with success; they do not necessarily have to excite pain or fear on the part of the child. In the hands of those who are skilled in psychic therapy it is perhaps advisable to employ methods avoiding discomfort to the child as much as possible.

Luminal, according to Calvin,[11] raises the threshold of nervous response and is valuable in the highly strung child. This was tried in doses of ½ to 1 grain at bedtime in 5 such cases that did not respond to psychic therapy. In most cases where luminal and psychic therapy failed, atropine was tried, as it relaxes the smooth muscle fibres of the bladder and increases the capacity to hold fluid. At the start, 1/400th of a grain of Atropine, 2 minims of Tr. Nucis Vomicæ, and 2 grains of Sodium Bromide was prescribed in a palatable mixture. The strength of this mixture was gradually increased until 1/100th of a grain of atropine was given at bedtime in the nocturnal cases and three times a day in the diurnal ones. To obtain the full physiological action of atropine it is necessary to have a fresh solution prepared every week or two. At times it is found useful to add half a grain of luminal to the atropine mixture. The dose necessary to help the child to secure 7 dry nights and days is maintained for a fortnight, and then gradually reduced. After all medicine has been stopped, an attempt is made to have each child return monthly for three months, to ensure that no recurrence has occurred.

RESULTS

The results obtained by the therapy outlined are shown below. (See Table II).

TABLE II

Form of Treatment	*No. of Cases*	*Cure*	*Improved*	*Not Improved*
Injection	45	24	10	11
Luminal	5	–	3	2
Atropine	11	5	5	1

Twenty-four, or 53 per cent, were cured following the injections; 10, or 22 per cent, were improved; and 11, or 24 per cent, were not improved; that is, 75 per cent were benefited to a greater or lesser degree by this form of treatment. Of the 24 patients cured, 9 required only 1 injection; 7 required 2; 6 needed 3; 1 was cured after 4, another after 5 injections. Seven of these cases relapsed, and of these 4 were persuaded to return to the clinic for further injections. Two were promptly cured with one injection, one required two, and the other three injections. Two of these four cases relapsed following infections. One in a boy of ten years relapsed following an acute coryza four months later; the other was in a boy of five years who relapsed three weeks later, also following a coryza. He was given a course of three injections and remained free from enuresis for eight months. Then followed a second and final relapse after another respiratory infection; this responded to two injections. In 5 cases where psychic treatment failed in nervous, highly strung children, luminal was tried, with improvement in 3. Atropine was tried in 11 patients who responded poorly to psychic therapy and 5 were cured, 4 being cured within one month. Five were improved and only one case showed no improvement.

SUMMARY

From the results shown, we feel that psychic treatment in the form of a hypodermic injection of sterile water is a safe and valuable addition to our measures in enuresis. Further, that the cases not improved by this means can in great part be relieved or cured by administering atropine and luminal, alone or together, in the manner described.

REFERENCES

1. HORTON, *Arch. Dis. Child.*, 1929, **37:** 4; 105.
2. BLEYER, *Arch. Dis. Child.*, 1928, **36:** 989.
3. HOLT, Diseases of Infancy and Childhood, New York, D. Appleton Company, 1919.
4. GROVER, *J. Am. M. Ass.*, 1918, **81:** 625.
5. WOOLEY, *J. Ment. Hyg.*, 1926, **10:** 38.
6. THOM, Everyday Problems of the Everyday Child, London, D. Appleton Co., 1927.
7. FRIEDELL, *Am. J. Dis. Child.*, 1927, **33:** 717.
8. BLAU, *M. J. & Rec.*, 1926, **124:** 492.
9. KOVATS, *Ztschr. f. Tuberk.*, 1923, **39:** 185; *ibid., Ztschr. f. Tuberk.*, 1925, **42:** 297.
10. MUELLER, *Ztschr. f. Tuberk.*, 1925, **42:** 294.
11. CALVIN, *M. Clin. N. Am.*, 1928, **12:** 131.

HOW SANATORIA CAN HELP IN THE PREVENTION AND CONTROL OF TUBERCULOSIS*

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THE title selected for this presentation to-night should give anyone sufficient scope and especially one who has been engaged in Public Health since 1909. It also could not be more inviting to controversial developments. This subject is always to the fore, with able supporters and doughty opponents, when an effort is being made to prove "who won the war" in so far as the decreased death rate in tuberculosis is concerned. Some of my best friends think that I am over-zealous in assigning to the sanatorium the keystone in the arch of accomplishment to date. The critics state that we shall never be able to accommodate all the cases in institutions; therefore, what benefit of any magnitude can accrue from a mere drop in the bucket. My experience as a medical officer of health has taught me that all communicable diseases, for reasons that are not yet agreed upon, have a self-limiting cycle of life in so far as epidemics are concerned. We know from Dr. Ferguson's study of the Plains Indians and from our reports about the tuberculization of the Six Nation Indians around Brantford, Ontario, that tuberculosis is endemic and epidemic in its behaviour.

Reverting to communicable diseases in general, it is surprising how often an epidemic, threatening to be large and out-of-hand, will apparently respond to honest, conscientiously applied control efforts which in themselves seem hopelessly inadequate. This is the reason for my pinning my faith on the sanatoria. Other reasons are that sanatoria are beacon lights of hope to the sufferers and their families; they represent concrete organized effort; the capital investment means almost always permanent commitment of the people to anti-tuberculosis effort; if voluntary, the committee's effort to support the institution carries with it a continuous enlightened governmental authority and public, and both of these are refreshed frequently by the appeals of the committee; lastly, sanatoria actually help some people to recovery and certainly segregate potential sources of infection.

OUR CANADIAN EXPERIENCE

A few months ago I was asked to address the Ontario Hospital Association on the sanatorium situation in that province. Almost synchronously I was engaged preparing a brief along the same lines for presentation to the Royal Commission on Public Welfare appointed by the same province. I am going to give you hurriedly some of the information I assembled at that time covering Canada.

Death rates.—All death rates mentioned refer to tuberculosis deaths from all forms of the disease, and are stated as per hundred thousand population.

Nova Scotia's death rate has declined from 201 in 1909 to 104.4. Ontario in the same period has changed from 106 to 56.7. Ontario had reduced its tuberculosis death rate from 148 in 1901 to 93 in 1921. All golfers know that it is easier to reduce their score ten strokes from 120 to 110 than it is from 90 to 80. I give these two provincial pictures because they may create an open mind as to whether we are obtaining the results we claim and what are the most helpful contributing factors. Personally, following conversations with a student of Canadian statistics, it is my opinion that a standardized death rate applied to all the provinces would not change the crude death rates we depend upon for comparison sufficiently to influence any deductions we may choose to make, even between Nova Scotia and Saskatchewan. The gross results are out of all proportion to the influence of the factor of correction.

* An address delivered before the Mississippi Valley Sanatorium Association at Rockford, Ill., October 14, 1930.

Institutional care.—The influence of institutional care on the ravages of tuberculosis has been overestimated, it is thought, by the most profound students of statistics, but is held by health workers, nevertheless, to be decidedly helpful and an economic procedure insofar as the state is concerned. An index of its influence is impossible to establish. Although we cannot say that institutional care is the cause of a known percentage of the drop in the incidence of tuberculosis, we can surmise that the sanatorium beds in one centre seem to have a greater influence than the same provision in another.

Influence of governing boards.—Is this due to the type of governing board? British Columbia, Alberta and Nova Scotia are operated directly under a government department; Saskatchewan, Manitoba and the Jordan Memorial Sanatorium in New Brunswick are operated, and Prince Edward Island will be, by an honorary board, carrying out very closely the wishes of the government. All other institutions are operated by cities or separate voluntary boards not closely related to provincial government influence. It would appear after comparing the sanatorium beds available under those three types of administration and the total patients treated in each type in 1927, that more patients per bed accommodation are cared for by the Provincial Committee institutions. Now as to the influence of these three types of governing boards and the type of home the cases come from to the respective institutions, it would appear that departmental administration outside of Nova Scotia does not influence this factor. In Nova Scotia 75 per cent of the cases treated at Kentville are self-supporting or financed by friends. Therefore, Nova Scotia becomes a separate type and will from here on be used for comparison with the other plans of operation.

Influence if indigents are treated.—It is my opinion that, on the whole, patients supported in institutions by friends or by themselves are better off financially, as a group, in their homes than those who accept full cost of the care as indigents in public wards. Further, it may be that they have enjoyed better educational privileges and also that their families are much smaller in number. It is not suggested that this is the result of education. It is dealt with here only as a condition.

Provincial comparisons.—To follow up this theme. Nova Scotia has singled itself out as the province having in its sanatorium the highest percentage of cases cared for at their own expense or at the expense of friends. Actually this group supplied 75 per cent of the patients treated at Kentville. The sanatoria of New Brunswick and Quebec also have higher percentages than the rest of Canada. Now we must connect these facts with provincial death rates. First, let it be known that although British Columbia has a death rate of 108.2 per 100,000 population for 1928, 35.2 per cent of this is due to North American Indians. The province is not responsible for their care or supervision. The balance of the population includes the Chinese, Japanese, and East Indians, with a tuberculosis death rate of twice that of the whites. The whites have a rate per 100,000 population of 70 in round numbers. Therefore, it compares fairly well with the average for Canada. However, tuberculosis deaths in 1928 —Quebec 121, New Brunswick 96, and Nova Scotia 104—have no reductions that can be made for similar reasons, and therefore their high rate may be traceable to something else.

How institutions affect death rates.—I suggest two things as affecting the tuberculosis death rate in the last three mentioned provinces: (1) not enough beds have been operating long enough; (2) not enough cases from poor homes have been treated. Both of these factors would have been corrected by greater voluntary effort and earlier education of the provinces and municipalities to pay for the upkeep of indigent cases. I firmly believe the care of indigent cases in large numbers is the greatest secret of the influence of the sanatorium on tuberculosis death rates. Now as to the number of patients treated in each province per 1,000 advanced cases existing there, we find some very striking indices. Quebec's rating is much the lowest in Canada, being 114.6 compared with Saskatchewan's 1177.6 standing. Quebec, incidentally, has nearly three times the population of Saskatchewan, nearly a third of Canada.

Saskatchewan heads all the provinces in the relation of cases of tuberculosis treated in proportion to the advanced cases of tuberculosis present in its population. Saskatchewan is second only to British Columbia in the percentage of its patients treated at the expense of

the municipal or provincial treasuries and therefore, on account of these two remarkable conditions, must be having the greatest possible influence on the reduction of the incidence of tuberculosis as a result of institutional care. Finally, Saskatchewan provides the greatest evidence of public interest in the anti-tuberculosis cause, since its citizens through its municipalities have requested its government to make the institutional care of all tuberculosis cases an entire charge against the municipal and provincial treasuries. This arrangement has been instituted by its government.

FOUR QUESTIONS

Are there any results, as shown by the index of tuberculosis death rates, from all the effort now being put forth? Yes. If so, is there any one feature which contributes a greater influence for better than the others? Yes, the provision of sanatorium beds. Does this feature yield different or more bountiful results under one type of management than under another in the different parts of Canada? Yes, when under the control of voluntary committees. To what is any such difference in accomplishment to be credited? To the predominance of indigent cases cared for.

I am sure this last answer is a surprise and an exception. Most people expect governmental or city sanatoria to cater first and always to the poor or indigent. Nova Scotia's provincially owned and operated sanatorium furnishes my exception and proof. The municipalities have never been sufficiently educated to pay their share of the cost of treatment of their indigents in the provincial sanatorium; hence, since 1905 or 1906, we have this, the only institution outside of Halifax, treating patients, 75 per cent of whom in 1929 were self-supporting or financed by friends. I am convinced this is a factor in the slow drop of the tuberculosis death rate in this province, in spite of the provincial treasury providing the first provincial sanatorium in Canada and contributing annually, possibly more per population for sanatorium treatment than any other province. The larger the proportion of patients treated from groups unable to pay, the greater the pressure we put on the strongest tuberculosis contributing group of our population.

Patients supported by official treasuries have: (1) less money (poorer homes, many of one room; poorer food, and less of it; poorer clothes, decreased earning capacity due to deprivation; longer hours' work at the least healthful work; and possibly neglect to visit or call a physician early); (2) poorer education (less knowledge of personal hygiene and proper methods of living and carrying out the instructions received, once the case is announced as tuberculosis); (3) larger families (more contacts).

In a sanatorium administered by a voluntary committee the administration has to be economical, efficient, humane, and present each year a report of stewardship which will attract not only the tuberculous sick to seek, without hesitation, the institutional treatment available, but the municipalities and public to give more and more towards the cost of construction and maintenance of the institutions. Enough beds will eventually be erected to provide the proper spread per bed for carrying charges. The beds will be filled with indigents from municipalities, which class provide sure and regular payment. The voluntary committee will make it its business to urge the municipalities and the government for necessary legislation and financial assistance.

SANATORIUM AUXILIARY SERVICES

The sanatorium medical staff, being a full-time salaried medical personnel, and being very proficient in chest diagnosis, is in a splendid position to offer the public, through the medical profession, valuable assistance in diagnosis and even in home treatment of all classes of patients. Also the sanatorium should make itself responsible for the after-care of sanatorium discharged cases by some scheme suitable to delay permanently, if possible, a flare-up of the disease through want of wage-earning occupation or through having to submit, without medical supervision, to detrimental employment. We have ante-natal and post-natal work in child welfare. We have ante-institutional and post-institutional medical privileges which are essential to the welfare of our anti-tuberculosis program.

Sir George Newman, Chief Medical Officer to the Ministry of Health and Board of Education, speaking in London in July this year, said: "In England and Wales the progress of the segregation in Poor Law institutions of poor persons suffering from tuberculosis (particularly in an advanced stage of the malady) has been accompanied for sixty years by a large and continuous

decrease of the disease as a whole, and in considerable degree *pro rata* with segregation." Dr. J. Parlane Kinloch, Chief Medical Officer of the Department of Health for Scotland, speaking at the same place on the same day, said: "It is common knowledge that a multiplicity of factors have been responsible for the accelerated Scottish decline in mortality, *viz.*, the law of the epidemic (perhaps the most important factor), the nutritional condition of the population, housing conditions and so on, but having regard to all such factors it seems reasonable to argue that the extensive bed accommodation and educative results obtained by means of the administrative schemes have been definite factors in determining the relatively greater extent of the Scottish decline in mortality during these years."

SUMMARY

Five favourable features in an anti-tuberculosis campaign chargeable to sanatoria are advanced.

Two reasons are given for favouring the voluntary committee administration of sanatoria, *viz.*, (1) a higher percentage of indigents cared for, 78 per cent in Saskatchewan, the ideal, and 25 per cent in the government institution in Nova Scotia; (2) greater educational influence required to maintain public and governmental favourable opinion and support.

Sanatoria are the keystone of the arch of accomplishment.

Two important privileges of sanatoria are outlined, and finally, I have backed up Canadian experience with British concurrence.

THE USE OF PHENOBARBITAL IN SURGERY

BY R. W. GRAHAM, B.Sc., M.D.

Oshawa

THE use of phenobarbital in surgery has attracted the attention of a few surgeons during the past year. The idea of using this drug for general anæsthesia developed from work chiefly done in Germany, where it was used as an adjunct to local anæsthesia. Bartlett[1] reported with apparent favour on the use of 15 to 20 grains of phenobarbital prior to operation under general anæsthesia. Our investigations were commenced four months before the publication of the article by Bartlett.

Under the direction of Dr. George F. Chandler, the use of phenobarbital preoperatively was investigated at the Kingston City Hospital. During four months, April 12 to August 8, 1930, over one hundred patients received phenobarbital. Careful records were kept on each case as to the length of the operation, the dose of phenobarbital, the interval of time between administration of the drug and the operation, and the quantity of ether used for anæsthesia. In our early investigations 10 to 15 grains of phenobarbital were administered two, three, or four hours before operation. This period of time was believed to be necessary to obtain full action from the drug. We were not favourably impressed with the results obtained. Its use, preoperatively, was about to be discontinued when the idea was conceived, on account of phenobarbital's known hypnotic action, of administering fairly large doses the night previous to the operation. This gave such consistently good results that the former method was completely discontinued, and the administration of 5 to 10 grains at 9.00 o'clock the night previous to operation was adopted. This procedure is now in constant use on this service. We believe this method of administering phenobarbital preoperatively to be original. We have suggested the name "matin sleep" in speaking of this method of preoperative preparation as it does for the surgical patient what "twilight sleep" does for the obstetrical patient. Most surgical operations are scheduled for the morning, hence the term "matin," and the patients approach it in a state of hypnosis.

The drug was given by mouth either as tablets or elixir. The dose which was found most suitable for the patient of average weight and fair general condition was 10 grains at 9.00 o'clock on the night previous to the operation. Smaller doses were tried, but a sufficiently definite action was not obtained to be worth while. A larger amount of 15 grains was also used, but after 16 cases this dosage was discontinued. Patients receiving 15 grains were excessively drowsy for three or four days, or were

excited and confused postoperatively, and required more than the usual amount of morphine to control them. In one case a patient developed dermatitis which was attributed to the phenobarbital; another developed a mild diplopia the day after the operation which lasted about one week; a third after herniorrhaphy was with difficulty kept in bed. We believe 15 grains to be an overdose. We have had no fatalities attributable to the use of phenobarbital. The dosage was varied somewhat, depending on the size, general condition and emotional state of the patient. A patient weighing 120 pounds would receive approximately 7 grains; for an emotional type this would be increased to 10 grains, and for one in a toxic state this would be reduced to 7 or 5 grains.

The length of time between the administration of phenobarbital and the operation was found to be important. In the early cases it was given

TABLE I.

PHENOBARBITAL, 10 GRAINS, GIVEN AT 9.00 P.M.

Chart No.	*Date*	*Operation*	*Length of Operation*	*Phenobarbital*	*Time Before Operation*	*N_2O and O*	*Amount of Ether*
			Minutes	Grains			Ounces
13902-A	5/14/30	Prostatectomy	20	10	9.00 p.m.	....	4
13826-A	5/29/30	Vaginal hysterectomy	10	10	"	....	3
13835-A	5/30/30	Hysterectomy and perineorrhaphy	40	10	"	....	6
13908-A	5/ 8/30	Breast amputation	20	10	"	....	4
13939-A	6/13/30	Pan-hysterectomy	35	10	"	n20	5
13964-A	6/17/30	Appendectomy and cholecystotomy	20	10	"	....	9
13965-A	6/18/30	Cholecystectomy	25	10	"	....	5
13966-A	6/18/30	Thyroidectomy	16	10	"	....	6
13984-A	6/19/30	Knee operation	20	10	"	....	6
13916-A	6/19/30	Perinephric abscess	30	10	"	....	6
14019-A	6/22/30	Appendectomy	13	10	"	....	6
14039-A	6/24/30	Cholecystectomy	20	10	"	....	4
14044-A	6/24/30	Cauterization of jaw	10	10	"	....	6
14088-A	6/27/30	Thyroidectomy	10	10	"	n20	6
14165-A	7/ 4/30	Abdominal hysterectomy	20	10	"	"	6
14184-A	7/ 6/30	Perineorrhaphy	24	10	"	"	6
14185-A	7/ 6/30	Salpingoöphorectomy and appendectomy	20	10	"	"	6
14244-A	7/10/30	Breast amputation	20	10	"	"	4
14258-A	7/12/30	Hemorrhoidectomy	15	10	"	"	5
14268-A	7/13/30	Tonsillectomy, adenoidectomy, dilatation, curettage, adenoma resected from right breast	40	10	"	"	4
14269-A	7/13/30	Appendectomy	15	10	"	"	5
14271-A	7/14/30	Appendectomy	15	10	"	"	8
14280-A	7/15/30	Cholecystotomy	35	10	"	"	8
14187-A	7/16/30	Hysterectomy	30	10	"	"	4
14305-A	7/18/30	Hæmorrhoidectomy	15	10	"	"	4
14283-A	7/19/30	Appendectomy	20	10	"	"	4
14334-A	7/21/30	Salpingoöphorectomy and appendectomy	25	10	"	"	4
14327-A	7/21/30	Cholecystotomy	35	10	"	"	6
14359-A	7/23/30	Bilateral herniorrhaphy and appendectomy	50	10	"	"	10
14221-A	7/28/30	Appendectomy	15	10	"	"	5
14222-A	8/ 2/30	Prostatectomy	20	10	"	"	4
14430-A		Hysterectomy	25	10	"	"	8
14508-A	8/ 5/30	Breast amputation	20	10	"	"	5
14509-A	8/ 6/30	Trachelorrhaphy	15	10	"	"	4
14486-A	8/ 5/30	Vaginismus	25	10	"	"	4
14107-A	6/30/30	Perineorrhaphy	25	10	"	"	5
14484-A	7/30/30	Hysterectomy and appendectomy	25	10	"	"	6
14465-A	7/31/30	Vaginal hysterectomy	20	10	"	"	3
13850-A	6/ 6/30	Salpingo phorectomy	20	10	"	"	5
13973-A	6/18/30	Bilateral salpingoöphorectomy, appendectomy	35	7	"	"	4
14098-A	6/28/30	Appendectomy	15	7	"	"	4
14139-A	7/ 1/30	Perineorrhaphy	45	8	"	....	8
14452-A	7/ 3/30	Perineorrhaphy	15	8	"	n20	8
14238-A	7/11/30	Appendectomy	15	6	"	"	5
14166-A	7/14/30	Herniorrhaphy	20	8	"	....	10
14293-A	7/17/30	Appendectomy	15	8	"	n20	7
14377-A	7/24/30	Appendectomy	15	7	"	"	5
13852-A	6/ 2/30	Hernia, undescended testicle	20	5	"	....	6
13876-A	6/ 6/30	Colostomy	20	5	"	....	4½
13922-A	6/12/30	Appendectomy	15	5	"	....	6

three or four hours before the operation. Later it was given twelve hours previous to operating. The later method has been adopted as it reduces the mental hazard of the patient, and assures him a good night's rest previous to the operation. Phenobarbital thus given is an advance in preoperative care. The patient goes to sleep peacefully about one hour after receiving it and rests uninterruptedly all night. In the morning, when he is being prepared for the operation, he rouses and goes back to sleep immediately afterwards. Some do not even pay any attention to the preparation. They usually appear to be aware of going to the operating room, but if left on the table for a few minutes they lapse into apparent sleep. They are never upset or uneasy. They take the anæsthetic quietly. Considerably less ether is required for surgical anæsthesia than is necessary for patients who have not received any phenobarbital. Many nurses state that they enjoy looking after phenobarbital patients, as they appear to have less nausea than others and rest more quietly. They sleep well the first night. The first postoperative morning they are awake, but are resting quietly.

Phenobarbital definitely reduces the amount of morphine required in the postoperative care of patients. Morphine is known to be inhibitory to the peristaltic action of the intestine and may be an important factor in paralytic ileus. The patients who have received phenobarbital preoperatively appear to have less abdominal distention than other patients. Normal intestinal activity seems to be resumed more easily.

The wide range of operations in which phenobarbital has been used will be observed from Table No. I.

The method of ether administration was by open cone. Anæsthesia was usually induced by nitrous oxide and oxygen. In this series the amount of ether required for anæsthesia was not appreciably altered by induction with nitrous oxide and oxygen. The average amount of ether used in the phenobarbital series was 5.3 ounces and the average time of operation 23 minutes; the average amount of ether used in the control series (Table II) 6.6 ounces and the average time of operation 19 minutes. This is an appreciable decrease in the quantity of ether used, especially when the longer time of operation in the phenobarbital series is considered.

Table III shows clearly that the greater the dose of the drug, the less ether is required for anæsthesia. It also illustrates that after about three hours the shorter the time interval elapsing between the administration of phenobarbital and the operation, the less ether required for anæsthesia: for example 3 hours before operation 4 ounces; 12 hours before operation 5.3 ounces required.

It will be observed that, on account of the time necessary to obtain the full action from phenobarbital, it is not suitable for use in emergency surgery.

TABLE II.

WITHOUT PHENOBARBITAL

Chart No.	*Date*	*Operation*	*Length of Operation*	*No phenobarbital*	*N_2O and O*	*Amount of Ether*
			Minutes			Ounces
13817-A	5/27/30	Appendectomy	10	.....	n20	6
13917-A	6/ 9/30	Appendectomy	30	.....	....	6
13965-A	6/17/30	Laparotomy	25	.....	....	8
14043-A	6/24/30	Appendectomy	16	.....	....	6
13975-A	6/26/30	Cholecystotomy	20	.....	n20	8
14276-A	7/14/30	Appendectomy	12	.....	"	4
14299-A	7/16/30	Hæmorrhoidectomy	10	.....	"	5
14014-A	7/21/30	Appendectomy	15	.....	"	6
14474-A	8/ 1/30	Bilateral herniorrhaphy	30	.....	"	10

TABLE III.

SUMMARY OF PHENOBARBITAL RESULTS ACCORDING TO DOSAGE WITH RESPECT TO AMOUNT OF ETHER REQUIRED FOR ANÆSTHESIA.

No. of Cases	*Dose of Phenobarbital*	*Length of Operation*	*Time Given Before Operation*	*Amount of Ether*
	Grains	Minutes		Ounces
16	15	21	3-4 hours	3.5
20	10	21	3-4 hours	4
39	10	23	9.00 p.m. (12 hrs.)	5.3
12*	6-7	21	9.00 p.m. (12 hrs.)	6
9	....	19	.....	6.6

*Group receiving less than 10 grains of phenobarbital; average dose estimated.

SUMMARY

Phenobarbital, 10 grains, given at 9.00 o'clock the night previous to operation largely overcomes the apprehension of the patient about to be operated on.

It decreases the amount of morphine required in the postoperative care of patients, and we believe there is less intestinal derangement, resulting in less postoperative distension, and thereby adding to the comfort of the patients.

It decreases the quantity of ether required for surgical anæsthesia by an appreciable amount.

I am indebted to Dr. George F. Chandler, Chief of Service, Kingston City Hospital, Kingston, N.Y., for permission to use the material presented in this paper.

REFERENCE

1. BARTLETT, *J. Surg., Gyn. & Obst.*, 1930, 51: 217.

SEPTICÆMIA IN CHILDREN*

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PERHAPS a better title for this paper would be "The Hopelessness of Septicæmia". The following case histories are submitted without the expectancy of adding much to our knowledge of the subject, but with the hope that a discussion may be provoked which will be generally helpful.

Septicæmia may be classified as follows:—(1) septicæmia of the newborn (sepsis neonatorum); (2) septicæmia secondary to congenital heart disease; (3) septicæmia secondary to cryptic foci in the vicinity of the mouth and ears.

SEPTICÆMIA IN THE NEWBORN

CASE 1

F. S., a healthy female infant, six days old, vomited blood shortly after nursing. The bleeding and clotting time were normal. The mother's left breast was tender. Her temperature was continually slightly over 100° F. It was thought that the blood originally came from the mother's breast as the infant was apparently normal during the rest of her stay in hospital. Three days after leaving hospital the baby showed evidence of jaundice and the temperature rose to 103°, remaining between 103° and 105° for four days, when the left elbow was found to be swollen and fluctuating. The child returned to hospital, where pure cultures of streptococci were obtained from the blood stream, elbow joint and spinal fluid. In spite of blood transfusion the infant died within twelve hours, and at autopsy a large abscess was discovered in the left lung, which was not detected during life.

CASE 2

A. M., a male infant, sixteen days old, had suffered from paronychia of practically all the fingers for ten days. The temperature was 101°. Otherwise examination was negative. Two days later the left hip was aspirated, and culture from the pus obtained gave a pure culture of streptococcus. The same organism was found in the blood stream at this time. During the next ten days the right shoulder and both sphenomaxillary joints were opened and drained and two blood transfusions were given. The infant died at the age of 28 days. An autopsy was not obtained.

CASE 3

I. L., a male Jewish infant, seven weeks old, developed a temperature of 102° and diarrhœa. The urine showed many pus cells. A tentative diagnosis of intestinal intoxication with pyuria was made. Two days later the abdomen was greatly distended, the umbilicus pouting and the fontanelle bulging. Streptococci and diplococci were isolated from the spinal fluid and streptococci from the peritoneal cavity and blood stream. Operation was refused. Blood transfusion was performed and anti-meningococcic serum administered. Death occurred within 24 hours.

CASE 4

H. D., a previously normal male breast-fed infant, one month old, the fourth child of a physician, had suffered from diarrhœa, vomiting, and fever for one week. The abdomen was greatly distended and appeared to contain fluid. The navel was pouting. At operation a large amount of thin pus was evacuated, but a thorough search for a focus was unsuccessful. Blood transfusion was immediately performed. Death occurred six hours after operation. Streptococci were recovered from cultures of the blood stream and peritoneal cavity.

CASE 5

B. W., an artificially fed male infant, aged seven weeks, had had a slight head-cold at five weeks, and fever, vomiting and convulsions for three days. The fontanelle was not bulging and evidence of meningitis was very slight, although the infant looked toxic. The spinal fluid was distinctly turbid and contained pneumococci on smear and culture. The same organism was found in the blood stream. Ten c.c. of Felton's anti-pneumococcic serum were given intravenously. Blood transfusion was considered useless. Death occurred within 12 hours.

SEPTICÆMIA SECONDARY TO CONGENITAL HEART DISEASE

The ultimate prognosis in congenital heart disease is probably not good. At least it should be guarded even in those cases which survive the first few months of life.

* Read before the annual meeting of the Canadian Society for the Study of Diseases of Children, Brockville, Ontario, June 20, 1930.

CASE 6

A. S., female, aged nine years, was considered to have a patent ductus arteriosus. Several cardiologists confirmed this opinion. Two attacks of pneumonia, a tonsil operation, and the usual contagious diseases of children including measles, whooping cough and chicken pox were successfully combated. Progress at school was normal. On December 21, 1929, after dancing at a school concert she was found to have signs of consolidation in both bases. The pneumonia ran a normal course until January 1, 1930, when, after what appeared to be a crisis, she had a severe chill and the temperature rose suddenly from 96° to 106°. During the next few days in hospital the following findings were made: Electrocardiogram, normal; white blood count, 17,000 per c.mm.; blood culture, pneumococcus, type 1; Mantoux test, negative; urine and spinal fluid, negative.

During her four weeks' stay in hospital she received three large blood transfusions and 65,000 units of Felton's antipneumococcic serum without the slightest beneficial effect. She lived five weeks after returning home, during which time Christian Science and various anointings and faith cures were tried. She died 11 weeks after the onset of her illness. The possibility of malignant endocarditis is hard to rule out as autopsy was not obtained.

CASE 7

G. W., a male infant, two years old, born with a congenital cardiac defect, had suffered from what was thought to be recurring pneumonia for two months prior to admission to hospital on March 4, 1930. Pneumococcus, type II, was recovered from his blood stream. The white blood count showed 30,000 per c.mm. The Mantoux test was negative. The urine and spinal fluid were negative.

A transfusion of 150 c.c. of the father's blood was given intravenously, and he was sent home with a fatal prognosis. Word was received three weeks later that he had died.

SEPTICÆMIA SECONDARY TO SEPTIC CONDITIONS IN THE MOUTH AND EARS

CASE 8

H. D., a female child, nine years old, whose home conditions left nothing to be desired, had suffered from frequent colds during the winter of 1928. For this reason her maxillary sinuses were opened and drained in September, 1929. On February 15, 1930, the left ear ruptured spontaneously after less than one hour of pain. A competent otologist was in constant attendance and found nothing requiring surgical interference until March 13th, when a temperature of 105° was thought to be due to a small abscess which appeared to be pointing on the left side of the soft palate. Two days later the temperature was again normal and the ear draining nicely. Two x-ray examinations of the mastoid at this time were negative. On March 18th, on account of a sudden rise of temperature to 105°, the mastoid was opened and found normal in appearance and the contents sterile on culture. On March 20th streptococci were found in the blood stream. The lateral sinus was exposed and opened and appeared normal.

Blood transfusions of 250 c.c. from donors recently convalescent from scarlet fever were given on March 21st, 25th, 29th, April 2nd and 9th (five in all). Antistreptococcic serum was given on March 23rd, and crystal violet solution intravenously on March 28th.

The white blood count varied between 14,000 and 17,000. On March 31st the left internal jugular vein was tied off and pus containing streptococci was found in the lateral sinus. On April 8th the left hip was found to contain pus and the joint was opened and drained. On April 10th cellulitis developed in the area of this wound and spread around the hip and into the vagina, causing a profuse sanguinous discharge which later became purulent. On April 14th a large abscess in the region of the right shoulder was opened and drained. On April 19th she was discharged as incurable. She died suddenly on April 23rd from a profuse vaginal or uterine hæmorrhage.

CASE 9

G.M., a girl, six years old, suffering from left otitis media, extensive dental caries, remittent fever, chills and a purpuric eruption, was admitted to hospital April 11, 1929, with a tentative diagnosis of meningitis. The spinal fluid was normal, but the blood culture was reported as being "loaded with streptococci". On April 13th she received 300 c.c. of her mother's blood and the right ear was opened. She made a rapid and complete recovery. Her tonsils and carious teeth were removed and she has been perfectly well ever since.

Mr. C. G. Russ Wood[1] reports the case of a nine-year old girl who showed no improvement after double mastoidectomy, and who had diplococci and streptococci in the blood stream. She was steadily getting worse, but showed marked improvement and ultimate recovery after daily ultra-violet general radiation. Mr. Sydney Scott, in discussing the case, mentioned a similar one in which a few irregular doses of radiant heat were associated with cure. He advised forcing fluids, at least 200 ounces per day, and saline purgation.

Cadham[2] reports a series of 18 cases of septicæmia with 16 recoveries. His method of treatment is as follows:—

A vaccine prepared from the infecting organism is injected into a rabbit or guinea pig on alternate days. After five to twelve days blood is withdrawn from the animal's heart, the serum is pipetted off, and 3 to 4 c.c. is administered to the patient subcutaneously. This is intended to supply the antibodies. At the same time 25 to 30 c.c. of blood serum from a suitable donor is given intravenously to supply complement. The treatment is continued every second day till sterile blood cultures are obtained.

The large percentage of recoveries in Cadham's series would seem to justify the more general use of his method.

REFERENCES

1. WOOD, *Proc. Roy. Soc. Med.*, 1928, 21: 22.
2. CADHAM, *Canad. M. Ass. J.*, 1928, 19: 54.

HEALTH ADVICE INDICATED IN THE EARLIER MANIFESTATIONS OF CARDIOVASCULAR DISEASE

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III*

THE subject matter of this article begins where diagnosis ends. Many cardiovascular disorders are secondary to well defined diseases, such as diabetes, nephritis, goitre and anæmia, which require special treatment for the primary condition. Advanced cardiovascular disease calls for special therapeutic measures which are not here considered. The views herein expressed apply to disorders which are revealed by a periodic health examination and in which symptoms are either absent, or present in such a degree as to cause little or no concern. Two groups may be specified. (1) Organic heart disease; usually rheumatic in young people, in others sclerotic, or occasionally, syphilitic. (2) Arteriosclerosis and hypertension, with or without renal impairment.

Before discussing details several general statements may be made. Structural changes are permanent, progressive and incurable; with the possible exception of syphilis they are not influenced by any treatment. This failure to respond accounts for the pessimistic view that cardiac therapy is useless, that the physician can do very little for heart or vascular disease. Such pessimism is not justified by experience; many patients are, in a clinical sense, improved mentally and physically, and life prolonged by a rational regime. Our present knowledge of the etiology of these disorders, and of pharmacology, does not warrant the use of term "specific", as applied to the remedies, yet, the various measures in use give relief and are therefore rational. Many of the distressing features are psychic in origin and must be treated by mental methods. They often begin when the patient becomes aware of his defects, and unfortunately the physician, thoughtlessly expressing a tactless opinion, plays, without intending to do so, an etiological rôle. The fact that symptoms are so produced has led physician and layman alike to express the view that a patient should be kept in ignorance of his true state as long as possible. Such a view is harmful and unreasonable as it deprives him of the incentive to follow a program which undoubtedly may prolong life. Those who still hold this view should read the article written by Osler in 1911 "On the advantages of albumen and casts in the urine."

The details of advice, which in an empirical manner lead to good practical results, may now be discussed under the following heads.

1. *Rest and exercise.*—The tolerance of the patient is the best guide to the degree of rest, or amount of exercise most suitable, and can be estimated with fair accuracy by an inquiry into his habits. Being an individual problem, no general rules can be laid down. Moderate exercise is usually well tolerated, and is beneficial, mentally and physically. Strenuous exercise should be forbidden. On the other hand severe restrictions may be an evil and rob the patient of certain benefits which come from moderate exercise. What the patient expects, and has a right to get, is a definite opinion as to what he can do with safety. He should be told whether or not he can play golf or tennis; whether he can walk one mile or five; and whether he can follow his occupation.

2. *Diet.*—There is no special diet for organic heart disease. Reduction in weight is desirable in those who are above the standard, and this is accomplished by prescribing a low-calorie diet. In arteriosclerosis a low protein diet is still the safest plan, in spite of recent views which state that such restrictions are unnecessary. Most people eat too much and a diet low in protein and total calories gives satisfactory results. It is, however, a mistake to reduce the food too low; weakness and even anæmia may follow such a course. One gram of protein per kilo of body weight is safe. A

* This is the third article published in the Periodic Health Examination Series. For the previous articles see *Canad. M. Ass. J.*, 1931, **24**: 407, 537.

typewritten menu is useful in most cases and can be constructed with the aids found in books on dietetics.

3. *Elimination of focal infections.*—It is generally agreed that focal infections should be eradicated whenever possible, although the part which they play in etiology is far from settled. Infected teeth and definitely infected tonsils are better out of the way; sinuses if infected should be treated by adequate methods; deeply seated infections, such as those in the gall bladder, appendix, prostate, tubes, etc., should be dealt with conservatively, as eradication is a serious matter. It sometimes happens that a too free interpretation of a sound principle leads to meddlesome treatment and unnecessary risk.

4. *Specific treatment.*—In patients who have syphilis it is good treatment to give intensive antisyphilitic remedies, but one cannot expect the organic changes to be cured; all that can be looked for is arrest of the progress of the disease.

5. *Symptomatic treatment.*—As a rule the indications will be obvious. Constipation is treated by the familiar remedies; insomnia by simple hypnotics, such as hot drinks, bromides, luminal, etc.; mild anginal pain, by nitroglycerin, bromides, chloral and other mild analgesics. Digitalis and allied drugs have no place in the class of cases under discussion.

6. *Psychotherapy.*—This is a very important therapeutic weapon, whether it enters the field by accident, or by design, or whether it goes by this or some other name. The psychic handling of patients taxes the resources of the physician, determines success or failure, and is worthy of careful thought. In any disease clinical improvement, in its broadest sense, is due to three factors, namely, natural recovery, specific and symptomatic remedies of known value, and psychotherapy. Cardiovascular disorders, being progressive in character, are not influenced by the processes of natural recovery. Specific and symptomatic remedies have a limited value. The third factor, therefore, assumes a place of major importance. It is common knowledge that many patients are made wretched by a tactless presentation of their case. What an army of cardiopaths owe their invalidism to the knowledge that they have some defect, a leaky valve, a systolic murmur, a skipped beat or a moderately high blood pressure! And it is this knowledge, rather than the disease itself, which accounts for such symptoms as palpitation, insomnia, disturbing dreams and general nervousness. There is now some danger that a "left ventricular preponderance" may add some recruits. The underlying psychic factor responsible for these symptoms is *fear,* and this furnishes the clue for rational treatment, preventive and curative; preventive by handling the patient so as to avoid the production of symptoms; and curative, by taking the means to remove them when they are already deeply rooted. It is not necessary to be a psychologist, a psychoanalyst, or even a trained neurologist, in order to apply the principles of psychotherapy. In fact there is reason to believe that it is a disadvantage to be too highly trained, as one frequently sees excellent therapeutic results in the hands of those who have not attained high rank in these specialties, or even in the methods of ordinary physical examination. The complexity of the subject is admitted. One has to reckon with the mental make-up of the patient which varies greatly. The factors which make a good psychotherapeutist are not easily defined, yet such factors do exist, and are capable of some analysis, however imperfect that analysis may be. This will not be attempted, but out of a chaotic mass of ill understood facts one may venture to offer with confidence a few principles which are sound and capable of useful application by any physician in the management of cardiovascular disorders. These are:

1. *A painstaking history and physical examination.*—The primary object of this is to elicit evidence of disease, that is, diagnosis, but its value does not stop here. It is an important factor in winning the confidence of the patient, which confidence is essential to successful treatment. If you convince the patient that you are interested in his problem, that you know your business, and, in the end, that you understand the nature of his defect, you have created a receptive soil for the advice to be subsequently given; if, on the other hand, you fail to get this confidence you establish a handicap which cannot be overcome, even if your academic attainments are of the highest order.

2. *Positive assertions of normal findings.*—These may be made in a casual way as the examination proceeds. For example, drop such remarks as "Your lungs are normal", "Your

pulse is strong and regular", in a heart case, "Your blood pressure is normal". When you examine the urine announce with evident satisfaction "There is no sugar or albumin present". Frequently the patient will indicate his sense of relief by saying "Thank God for that much anyway". At this stage avoid stressing unfavourable features, and in reply to questions tactfully put off an answer which is likely to engender fear. Such casual statements, which really act as helpful suggestions, are not lost, but sink into the subconscious mind and play a definite part in maintaining a state of mental comfort.

3. *A half hour talk.*—For the patient this is the most valuable part of a consultation. Place yourself and your patient, comfortably seated, face to face with each other. Do not give the impression of hurry and make him feel that his problem is the most important one in hand. Frankly state your findings. In other words, admit his disabilities, but do so in a manner which will cause the minimum of fear. Answer his questions truthfully, yet tactfully. Such statements as "People with a defect like yours live for many years and enjoy life"; "Your defect is not serious but worth looking after"; "Your blood pressure is above normal, but not at a dangerous level," are true and helpful. On the other hand such statements as "You certainly have a high blood pressure"; "You may possibly live a year or two"; "There is danger of a stroke"; "You should make your will" are injurious and therapeutically unsound. Furthermore, they are only partially true. While the prognosis may be known in a group, no one can tell with certainty what is going to happen nor predict the span if life in the individual. Any statement or action which leaves doubts or fears in the mind of the patient is harmful and should be avoided. The main object of psychotherapy is to combat fear, and it is useful to illustrate explanations with easily understood facts. The nature of fear may be explained in many ways. For example, one may discuss the effects of fear in a normal person. When a bear is met in the woods certain mental and physical changes are produced in a normal reaction; trembling, weakness, rapid pulse, palpitation, rapid breathing, sweating, goose flesh, dilated pupils, nausea, vomiting, polyuria and in extreme cases involuntary urination and defecation may occur. If a stump is seen and believed to be a bear the reaction is identical. The symptoms are the same, whether the object of the fear is real or imaginary. The disappearance of the symptoms so produced, in other words the cure, is brought about by the realization that the stump is only a stump and not a bear. Many of the symptoms of cardiovascular disorders are due to fear—fear of sudden death, fear of paralysis, fear of invalidism. The patient when he becomes aware of some defect invariably assesses it at a wrong and exaggerated value, and at once the various manifestations of the emotion of fear declare themselves. To prevent these, or to remove them when present, it is not sufficient to say that the defect is trivial and not serious, nor that the symptoms will disappear if the patient stops worrying about them. One must attack the subconscious mind and the procedures cited above are effective weapons. It is no mere accident that a patient enters a consulting room in a state of great nervousness and acknowledges before leaving that he "now feels much better"; his mental complexes have been touched; something has been released. Many physicians are good psychotherapeutists without knowing it. These are the physicians who make the patient "feel good". Psychotherapy is not, as some still maintain, a species of humbug or charlatanry. It is a rational and scientific method; the results are real and convincing, and no physician should omit it from his scheme of treatment.

There are few of the greater physicians of the past who have had such good fortune with posterity as Fracastorius. Judging the man by the indifferent, meditative guise apparent in his portraits, his preference for a restful, retired life by the Lac du Garde, his garrulous, confiding literary manner, a veritable logorrhœa for a man otherwise taciturn, his way of getting wrapped up in a subject without regard to the reactions of his readers—all these traits betoken the careless, easy-going, good-natured being whose inclination to "woo the strumpet Fame" was that of a sluggard, if not of a laggard. Everything about Fracastorius suggests the logical opposite of a "go-getter." He has, if anything, a touch of the disinterested amiability, the indifferent ease and repose of Clelia Conti, Duchesse de Sanseverino and the other Stendhal characters we like so well. It seems comical, for instance, that we should now call the "greater pox" (*lues venerea*) by a fanciful name which careless Fracastor distorted, by misspelling and false quantity, from Sipylus son of Niobe, slain by Apollo. It is a delightful example of the luck of the easy-going.—F. H. Garrison, *Bull. N. Y. Acad. Med.*, 1930, **6**: 829.

THE PHYSICS AND BIOPHYSICS OF X-RAYS AND RADIUM*

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IV

IT is taken for granted that electrical terminology and the parts of an x-ray equipment, including the x-ray tube, are familiar to all. In order to produce x-rays it is necessary to utilize a high tension current with a minimum of approximately 20,000 volts. The newer types of x-ray tubes require an additional electrical circuit in which the voltage is stepped down to approximately 12 volts. This low voltage is for the purpose of heating a small filament of wire in the x-ray tube in order to liberate electrons. The x-ray tube is pumped free of air. In a perfect vacuum no current can pass. Electrons must be present in the tube in order to carry the current across the vacuum. The mere presence of electrons in the tube is not sufficient, however, to produce x-rays. The high tension circuit entering at the anode of the x-ray tube attracts these negative ions or electrons into what is known as the "cathodal stream." This stream of electrons is driven against the anode of the tube with terrific force. The anode of the tube is constructed of a very resistant metal, which is necessary to withstand the heat produced by the impact. The x-rays are produced at the point of impact and are of an entirely different nature from the cathode rays which produce them.

X-rays are analogous to light rays, except that the wave lengths of the former are much shorter than those of the latter, and have the following properties. First, they are not deflected by a magnet; secondly, they are invisible, but cause fluorescence and phosphorescence of certain substances; thirdly, they affect photographic emulsions like ordinary light; fourthly, they travel in straight lines, that is, they cannot be reflected or refracted, if we except the slight reflection that takes place when the x-ray is passed through crystals; fifthly, they pass through all known substances with varying degrees of intensity; sixthly, they cause gases to become conductors of electricity, or, in other words, they cause the ionization of gases; seventhly, they have marked effects on living tissue.

RADIUM

Madame Curie toward the end of 1897 became interested in Henri Becquerel's experiments with the salts of uranium. Becquerel had shown that uranium affected photographic plates in the same way as if they had been exposed to light or x-rays, that is, they were fogged. Upon the invitation of Professor Becquerel, Madame Curie decided to investigate this phenomenon. The first step in the process of investigation was to analyze some uranitite ore, commonly called pitchblende, from St. Joachimsthal, Bohemia, for radioactivity, by the means of an electroscope. Through faithful and painstaking research radium was finally isolated as the principal radioactive substance.

Radium-containing ores have been identified in the Belgian Congo and in the States of Colorado and Utah. The radium content of the ore mined in the Belgian Congo, *viz.*, uranitite (pitchblende), is forty times greater than that of Colorado, *viz.*, carnotite. As a result of this comparatively high production of radium from the Belgian product the world's supply to-day is derived from that source. In the case of pitchblende, almost pure uranium oxide, in the ratio of one to four million, may be recovered, as compared with the Colorado carnotite, in which the proportion is one part in two hundred million. The process of chemical procedure necessary for the concentration of radium now consists of fractional crystallization.

Measurement of radium and its derivatives.—

* This is the fourth article in the series being published on Physio-Therapy. For the preceding articles see *Canad. M. Ass. J.*, 1931, **24**: 263, 409, 539.

Madame Curie prepared 21.99 milligrams of pure anhydrous radium chloride containing 16.75 milligrams of radium element, which was accepted as the international standard in 1912. In measuring the activity of a radium specimen the electroscope is brought into use. While the details of "measuring" vary in different laboratories, the fundamental principles are always the same. The measurement of a quantity of radium or its products is based upon the electrical effects of the radiations emitted therefrom. These radiations are capable of ionizing a gas and such a gas, previously a poor conductor of electricity, becomes a good conductor. If the ionized gas is between two metal plates or electrodes in a suitably constructed ionization chamber, there will be a flow of current through the ionized gas from one electrode to the other, the magnitude of which may be measured by electrical instruments (galvanometer, electrometer). The rate of motion of the gold leaf in the electrometer over a given scale is a measure of the ionization produced by the radiation in the ionization chamber. When such rates of motion are attained for known and unknown amounts of radium salt or emanation their ratios can be readily obtained and the unknown can be calculated in terms of the known.

The unit of emanation is the curie, which may be defined as the amount of radon in equilibrium with one gram of radium element. In practical work where very small amounts of emanation are employed the millicurie (1/1,000 curie) is the standard unit of quantity. A millicurie of radon in radioactive intensity is equal to a milligram of radium element.

When speaking of "milligrams of radium" it is now understood that we mean radium element. But if the writer states that he used a given amount of radium bromide, we know that he was using approximately one-half that amount of the element, since pure crystalline radium bromide contains 53.6 per cent of radium element. Therefore, in reporting radium results, the author should state definitely the number of milligrams of the element employed, the form of applicator, the length of application, and whether or not distance screening was used.

There are four radium salts commonly employed, radium sulphate, radium carbonate, radium chloride and radium bromide. Radium sulphate and radium carbonate are insoluble in water. Radium chloride and radium bromide are the soluble salts. The salts of radium most generally used are the sulphate, bromide and chloride. The sulphate is the salt used in the tubes of radium. The bromide, being a soluble salt, is employed in preparing emanation tubes, and the chloride is the salt used in preparing ampoules for intravenous injections and radium solution for drinking.

The percentage of radium element in the above mentioned salts, when pure, is as follows:

Radium sulphate ($RaSo_4$) contains 70.2 per cent of radium element.

Radium bromide ($RaB_2\ 2H2_0$) contains 53.6 per cent of radium element.

Radium chloride (Ra CL2) contains 76.1 per cent of radium element.

In other words, there is one milligram of radium element in 1.42 milligrams of the sulphate, or in 1.87 milligrams of bromide, or in 1.31 milligrams of the chloride.

THE ATOMIC THEORY

We are all familiar with the concept of matter as made up of atoms and molecules. A study of the subject from our point of view discloses an important fact, namely, that all the elements are made up of positive and negative electricity. The nucleus of an atom has a positive charge and around the nucleus a number of negative electrons are distributed, all within the atom.

The *non-radioactive atom* has an equalized electrical charge, that is, the positive nucleus has revolving around it negative electrons sufficient to neutralize the positive charge of the nucleus. In *radioactive atoms* there is instability, *i.e.*, there is a continuous breaking up into simpler atoms. This is due to the difference in the number of positive ions (protons) in the nucleus as compared with the encircling negative electrons. A radioactive element is gradually and constantly changing of its own accord, irrespective of environmental conditions. It should be noted however, that the gradual change is due to the explosion of a certain percentage of atoms of the element per unit time. This rate of change is different for different elements, but is constant for and characteristic of each radioactive element.

Disintegration of radium due to radioactivity.—After radium is extracted from its ore the amount gradually decreases. From the fact that the average age of the radium atom is 2,400 years we deduce that the amount will decrease at the rate of about 0.04 per cent each year, and in sixteen hundred and ninety years one-half of the initial amount will have disintegrated. In an additional period of sixteen hundred and ninety years one-half of the remaining amount will have disintegrated and therefore one-quarter of the initial quantity will still remain. The disintegration will continue at this constant rate of one-half in 1,690 years. The expectation of life for radium atoms, irrespective of their age and the rate of disintegration, remains constant until the number of atoms remaining is so small that statistical methods are no longer applicable.

One can calculate the length of time required for one-half of a given amount of radioactive material to disintegrate, (this is called the one-half value period and is related to the average life of atoms of a radioactive element) by the simple expression—the average life equals 1.43 times the one-half value period. Thus, for radium, the one-half value period is sixteen hundred and ninety years and the average life is $1.43 \times 1690 = 2{,}400$ years, or, in simpler terms, we may state that radium loses about 1 per cent in twenty-five years. With the disintegration of radium several radioactive substances and certain non-radioactive products are produced in the process of transformation, such as radon, which is further converted into radium, A, B, C, C^1, D, E and F. The non-radioactive substance of greatest importance is helium gas.

The Preparation of Radon

The emanation is obtained from radium—most commonly from radium bromide—by making a solution with water, to which hydrochloric acid is added, in the collection apparatus. The emanation liberated from the solution is allowed to accumulate in a flask provided for that purpose in connection with the apparatus and from which it is pumped off at stated intervals. These intervals depend somewhat upon the milligram content of the radium in solution, but ordinarily are about twenty-four hours in length. The radium emanation, together with the other gases given off by the solution—helium, aqueous vapour, hydrogen chloride and bromide—is now transferred to a purification chamber, using a simple Templer mercury pump. In the purification chamber the extraneous gases are eliminated, and the radium emanation is transferred to the receptacles in which it is proposed to put it for therapeutic use. When the radium emanation has been in these containers for three hours it has developed its maximum amount of radiation.

Types of Radium Rays

When radioactive materials were first studied the nature of the alpha, beta and gamma rays was unknown. Superficially, they all exhibited certain particles of true radiation and for this reason they were called alpha, beta and gamma rays, following the precedent commenced by Roentgen in regard to x-rays. This nomenclature is still used, although it is known that alpha and beta rays do not constitute true electromagnetic radiation as do the gamma rays. It has been found that 92 per cent of radioactive energy is emitted as alpha rays, 3.2 as beta rays and 4.7 as gamma rays. In contrast to this, the alpha rays are the least penetrating, being completely absorbed by a sheet of ordinary paper, while the gamma rays have the greatest penetrating power, being able to pass through many millimetres of lead. These figures demonstrate a great economic loss, when we consider that 92 per cent of the energy of a given quantity of radium is unavailable because the radiation is stopped by the container of the radium.

The Transmission of Rays Through the Tissues

When x-rays pass through a substance like the body tissues their intensity decreases. The therapeutic action of the rays is proportional to the portion of the rays absorbed in the tissues. When rays of only one wave length are passing through tissue their intensity decreases from layer to layer with uniform percentages or in accordance with the well known "Exponential Absorption Law" for homogeneous radiations. The secondary radiations from the scattered rays are found to be of a lower degree of penetrating power and therefore may be completely absorbed. While,

therefore, highly penetrating rays are capable of reaching much greater depths without being very strongly absorbed, these rays, because of the very marked scattering which they undergo, are transformed in the depths of the tissue into rays which are more strongly active upon the tissues than the primary or incident rays. This probably constitutes the principal point of advantage of the highly penetrating rays which are very advantageously utilized in deep x-ray therapy to-day. Irrespective of how the rays are scattered or how many secondary rays are formed, they travel from the place where they are produced through the tissues in all directions until absorbed. The distance of the tissues to be treated from the surface of the body largely determines the size of the area to be exposed to the rays. The greater the depth of the tissue requiring radiation the larger should be the exposed skin field.

THE LAW OF RADIATION

The intensity of the radiation varies inversely as the square of the distance from a point source; for example, note how the dose of radium decreases. (See Fig. 1). The same applies to x-rays.

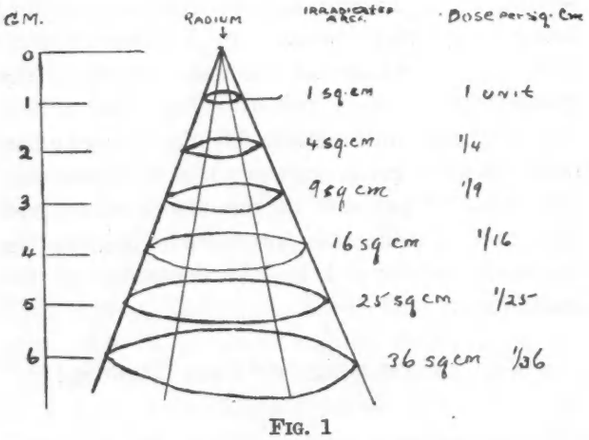

FIG. 1

THE QUALITY OF THE X-RAYS

Soft rays and long waves, or short waves and hard rays, are synonymous terms. The pentrative power of a given radiation depends on the voltage of the high tension current applied to the tube. The exact peak voltage is measured by the sphere gap which is the method of measurement adopted by electrical engineers. The radiation emitted from an x-ray tube is a mixture of rays of different wave lengths and therefore of different penetrability. The less penetrating rays (soft) are retained in the surface tissues, while the short wave length rays pass on into the deeper parts. In view of the fact that the beam of x-rays is not homogeneous the soft rays must be eliminated, and this is done by intercepting or absorbing them by the means of filtration before the radiation reaches the skin. The proper use of filters permits the maximum radiation effect at a depth and a minimum effect on the surface of the body.

It has been established beyond all question that dosage not based on the homogeneous radiation cannot be accurate. Practical homogeneity is determined by placing uniformly increasing filter thicknesses in the path of the rays and determining the quality of the transmitted beam. If then the decrease of the intensity caused by each filter thickness is calculated it will be found that the percentage decreases and gradually becomes smaller until it tends to remain constant. This constancy of the percentage indicates homogeneity of the rays and that the filter thickness is the correct filter to use for that particular radiation. This estimation requires the use of an ionization chamber.

FILTRATION OF RADIUM

Early in the therapeutic employment of radioactivity it became evident that it was essential to select the rays applicable to the particular form of treatment desired, and to reject all others. At the beginning of this century efforts in this direction were made by certain pioneers, who interposed substances between the tissues to be irradiated and the source of radioactivity which would prevent the passage of the less penetrating rays. Thus, if the alpha rays are to be excluded, a piece of aluminum, one one-hundredth of a millimetre in thickness, will be sufficient to absorb them and prevent their further penetration; the greater part of the beta rays can be held back in the same way by a sheet of lead one millimetre in thickness. If both these metal screens should be interposed it is evident that practically pure gamma rays would pass through to the tissue to be irradiated. It might be desirable to still further increase the penetrating power of the remaining rays by filtering out the softer gamma rays, and for this purpose a sheet of brass two millimetres thick would serve.

This principle once established, and the types of filters best suited to varying requirements

having been more or less standardized by experimentation, the administration of radioactivity is carried out with a fair degree of accuracy by the employment of filters of different thickness and density, thus applying more or less penetrating rays as the necessity of the case under treatment demands. Platinum has found a usefulness in all the situations where metals could be suitably employed, because 0.5 millimetre of platinum is equal to that of two millimetres of brass, the substitution of platinum makes it possible to use a smaller bulk of filter, which, especially when needles are being employed, is often a matter of considerable moment.

BIOPHYSICS

Under this caption we will deal particularly with the susceptibility ratio of the various types of the body tissues. This is important for the reason that when a certain pathological tissue is to be treated it is not only necessary that we know the particular action upon this abnormal tissue but that we have a knowledge of the effect on the surrounding normal tissue. It is well known also that all living cells do not exhibit the same susceptibility to radiation. It is necessary to adjust the dose and administer the radiation in such a way that the diseased tissue will be caused to retrogress without serious injury to the surrounding normal tissue and the patient as a whole. It is recognized, however, that in order to have a destructive effect upon any particular tissue the bordering normal tissue will also be injured.

On the basis of the current explanation of the action of x-rays on matter we may say that they produce, first, changes in the electrical state of the protoplasm (ionization), and, secondly, profound chemical changes involving the structure and consequently the properties of the atoms themselves. According to Hirsch "An overstimulating effect by the x-rays does not exist. Every dose of the rays however small acts detrimentally on a cell. The apparent stimulation of the growth, for instance, of a carcinoma, by a single isolated small dose should not be explained as directly due to the action of the rays in exciting cells to increased activity when applied in small doses. There is a differential action of the rays on cells in various stages of health and disease, in youth and age. A small dose may do much harm to a group of cells in one condition and leave another group comparatively untouched, to grow and proliferate at the expense of the first group when the radiation is over. A larger dose on the other hand would do more general injury and affect cells of varied groups and so impair the general vitality of the growth.

"It may be generally conceded that the radiation insult to the cells themselves does not produce a stimulation. From clinical observation we do know that there is a reaction to the tissue trauma with inflammatory sequela in keeping with a reaction, but with the subsidence of the reaction we see a definite retarding of the growth of the tissues under treatment. The period elapsing from the date of treatment until the state of cell destruction depends upon the nature of the tissue being treated, the quality of the rays, and the duration of the treatment."

There are six histological characteristics which determine tissue susceptibility to radiation, and all are of a cellular nature.

1. The more embryonal or undifferentiated the type of cell, the greater is its radio-susceptibility; and, conversely, the more differentiated, highly-specialized the type of cell, the greater is its radio-resistance.

2. Cells in the process of dividing are eight to fifteen times more vulnerable to radiation than in the resting condition.

3. Cells containing large amounts of chromatin in the nucleus are more easily killed than those containing little chromatin.

4. The endothelial lining of blood and lymph vessels is very radio-sensitive, and tumours having an abundance of thin-walled, delicate capillaries react much more quickly and favourably to radiation than corresponding tumours having a scanty blood supply.

5. Tumours having small amounts of intercellular connective tissue react much more quickly and favourably to radiation than new growths with a well formed supportive structure.

6. Secreting cells are in general much more radio-sensitive than non-secreting cells, particularly if such cells produce crystalloid or crystallizable material containing inorganic salts.

The presence or absence of any one of these characteristics to a marked degree enables one to predict that the growth will or will not react favourably to radiation properly applied. The radio-susceptibility of cells does not in any way

depend upon the anatomical location, but depends entirely upon the histological picture presented. According to comparatively recent research, the more malignant the growth, the greater is its radio-sensitivity.

The degree of malignancy can now be estimated fairly accurately. Four grades have been established, depending upon the degree of differentiation of the malignant cells, the number of mitoses seen, and the presence of atypical chromatin masses.

The future of radiotherapy in the field of medicine rests entirely upon the basis of a greater knowledge of the physical properties of radioactivity and a correlation of these with the biological effects.

ON THE USE OF NASAL SPRAYS AND DROPS

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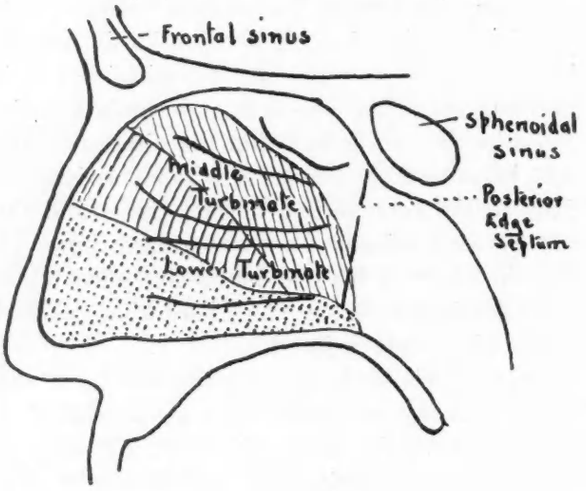
IN many nasal infections, especially perhaps in the ordinary cold in the head, there is such a secretion of mucus and so much congestion that any nasal application has but small chance of reaching the inflamed surface. The exhibition of atropine, 1/150 of a grain, is usually sufficient to dry up the nasal secretion. Nor does this amount produce any serious disturbance, save in the very rare cases of idiosyncrasy to the drug. This is perhaps more common in young children. The heart rate will be decreased by 5 to 8 beats, or less, a minute, and no increase will occur. The mouth will be dry, but not uncomfortably so, in most persons. The membranes of the nose can now be reached by any medicament chosen. The congestion of the mucosa can be reduced by the use of an ephedrine spray or nasal drops.

Applications of medicaments to the nasal mucosa are usually made with an atomizer, such as the DeVilbiss, or by drops. The ordinary person places the bulbous end of such an atomizer in the nose, the atomizer being held horizontally, gives two or three vigorous blows, and is satisfied. Dependent on the size of the passages and the swelling and form of the turbinates, more or less of the lower meatus and of the anterior end of the middle meatus and lower turbinate is reached. This statement is based upon experiments in which liquid paraffin, with which lamp black had been thoroughly mixed, was used. The nose had been previously cocainized, so that the passages were larger than normal. The location of the blackening was then determined by the use of a nasopharyngoscope. The area of distribution varied with the nose used, but in a typical case with rather small nasal spaces, the result was as shown by the stippled shading in the diagram of the lateral wall. The distribution on the septum corresponded to this area. (See Fig.)



Area covered by horizontal spray.

Additional area by spraying upward.

Additional area that was seen to be covered by drop method. Probably a much larger area covering the upper turbinate was covered by the oil.

The subjects of the experiment, all of whom knew the anatomy of the nose, then tried to reach higher areas by pointing the atomizer upward and in various directions, but still using the protecting bulb. The areas covered were increased, in the case referred to covering the area shown. The trained rhinologist then re-

moved the bulb, and by inserting the tip into the nose, attempted to cover the whole area. He indeed covered a larger, but not much larger, area.

Subsequently, another method was employed. The subject inserted into his nostril an eye dropper containing about ½ c.c. of the oil and held the nostril, tilted his head well back, released the oil, removed the dropper and closed the nostril; then bent well down, holding the head as low as possible, and turned his head from side to side, gradually elevating it; then put his head again well back and bent it to both sides. In this way the whole nasal area that could be viewed with the nasopharyngoscope was covered. If this performance is repeated with a nebula such as No. 3 below, the distribution can be felt, and, if well done, no trace of the ingredients reaches the mouth, and no sensation of its presence comes from the nasopharynx. The black deposit appeared in the handkerchief for three to four hours.

The authors would respectfully urge upon physicians that their duty does not end with recommending the use of a spray or nasal drops, but that they should instruct the patient how these should be used. The spray should be directed horizontally and then upward and finally more upward till parallel with the nose profile, and, finally, without the bulb, into the orifice with the tip directed upward. But the authors would more strongly recommend the use of drops put into the nose and retained while the head is placed in various positions; down and from side to side, gradually upward from side to side, and finally backward and from side to side. Naturally, the method of rolling an instillation about can be applied to water solutions, and of these the authors would select argyrol, in 5 to 15 per cent solutions.

A modification of this method is to lay the patient down with his head well back below the shoulder level (say, with the head over the end of a table). Insert the oil and roll the head about. There is little doubt that the oil glides over the surface and reaches spaces not easily reached by an ordinary spray.

The incorporation of the antiseptics, menthol, thymol and eucalyptol in an oily base undoubtedly decreases their antiseptic effect, but there seems good clinical evidence that such applications can do good. Whether this is due to the oil or to the other ingredients perhaps cannot be determined; but again there seems good reason to believe that the antiseptics have some effect.

The amount and type of antiseptic naturally varies with the preference of various physicians and the state of the membrane. It has been found by experiment that 4 grains of either thymol or menthol per ounce is definitely irritating to many persons, leading to very marked burning and pricking sensations, with a considerable production of mucus. This is hardly evident with the same strength of camphor. Eucalyptol in this strength is hardly noticed, but some persons appear to find eucalyptol irritant in almost any concentration. Even 10 grains of eucalyptol per ounce is found by many to be quite bland. Recently, there has been an increasing tendency on the part of the specialist to employ lower concentrations of these antiseptics. For young children, menthol and thymol would be either omitted or used in ½ gr. or 1 gr. per ounce; eucalyptol 3 to 5 grains per ounce only. For adults, thymol and menthol (2 to 3 grains per ounce), eucalyptol (3 to 10 minims), and camphor (4 to 5 grains) seem to be the favourite concentrations.

In regard to oil of pine, the official oil is Oleum Abietis, Oil of Siberian Fir or Oil of Pine, but this is not usually dispensed, Oil of Pinus Sylvestris being used instead.

As a simple oil nebula for a child, the following may be tried:—

℞	Eucalyptol		min. v
	Paraffini Liquidi	ad	℥ i

For adults, the following:—

℞	Thymol		
	Menthol	aa	gr. ii
	Eucalyptol		min. iii
	Paraffini Liquidi	ad	℥ i

℞	Menthol		gr. iii
	Camphor		gr. iv
	Eucalyptol		m. iii
	Paraffini Liquidi	ad	℥ i

For the Eucalyptol, Oil of Rose or Oleum Abietis may be substituted.

Clinical Conferences

A CASE OF MYXŒDEMA

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THIS patient is being presented to-day because he exhibits a disease which is not rare, which can usually, as here, be diagnosed with confidence on the strength of the history and physical findings alone, which is very amenable to treatment, and yet one which is commonly overlooked for months or years.

G. B., aged 50, farmer, came four days ago, complaining of general weakness, poor memory, clumsiness in the legs, shortness of breath on exertion, and hard hearing.

Family history.—His father is 88 years of age, and is now paralysed; his mother died two years ago at 86; one sister has had a goitre for 15 years. He is married with twelve children, all healthy.

Personal history.—He was never sick prior to this illness, except for sunstroke twelve years ago, when he was unconscious for half an hour, but he was all right next day, except for occasional dizziness on stooping and rising at work, a symptom which continued for a year.

Present illness.—Eight years ago he began to feel tired after a day's work, a disappointing experience, as he had previously prided himself on his strength. Five winters ago he felt the cold very much; three winters ago, he did not go to the bush as usual, because he "could not walk fast enough to keep out the cold"; during the last two winters, he felt the cold still more and stayed in the house in severe weather. For the last few years, he has been constipated, but only in the last two years has constipation been very troublesome and he has required an aperient regularly. There is soreness and aching under the left costal margin with bloating after meals, when the bowels do not move well; he has suffered from vague abdominal pains in the last eighteen months, but has eaten everything.

For three or four years he could not carry a heavy pack on his back, as his knees were weak, and there has been numbness of the feet and lower half of the legs in the last year, so that he says he hardly felt discomfort if one trod on his toes. The fingers have been clumsy and a little numb in doing any fine work. He gave up the farm to his sons 18 months ago, because of his condition.

For two or three years, he has been a little puffy around the eyes and has been somewhat hard of hearing. His memory has been failing for a couple of years; while he remembered distant events quite well he constantly forgot where he laid his tools and what he had told his sons to do on the farm the previous day; on going to town he forgot half his errands. He has been impatient and irritable, especially at noises, in the last eighteen months; he has talked indistinctly, "as if he had gum in his mouth", according to his son, for fully two years, and recently has noticed that his lips are thicker than before. Two years ago, he gained 20 pounds in a few months and has remained at this increased weight since; his feet and legs have been swelling recently when he walked much, but have been normal in the morning. He has had cramps in the calves of his legs in the morning and has often wakened with cramps. He found that these came when he stretched himself and he has learned to avoid doing so; if he were tired at night, cramps in the calves might come as soon as he stretched out in bed. He noticed his skin to be drier for over a year; he did not perspire at all last summer and his skin scaled a great deal, so that on shaking his underwear, the scales would "fall like talcum powder"; he amused himself by scraping the scales off his forearm with a jack knife, collecting them in little piles.

He has been a little short of breath for a year; has had no colds; has had no frequency or pain in urination; his hair has not come out much in recent years.

Physical examination.—You see a strongly built man who looks quite 55 years of age; he is 5 ft. 6¼ in. and weighs 165 pounds, stripped. He has a broad, stolid, rather swollen looking face and is pale, with dilated capillaries on the cheek and some cyanosis of the ears and cheeks; the upper eyelids are much swollen and the thickened lower lids are baggy below, so that the eyes look partially closed. He has thick, very bristly eyebrows, which are thinned in the outer fifth; the hair of the head is moderately thick, greyish and bristly, but there is a bald area extending back from above the temples on each side; the moustache is thick. The lips are very pale, full and thick; the thyroid is not palpable; there is marked fullness under the chin and the neck is rather short and thick.

The skin is pale and cold to the touch, especially on the extremities and is extremely dry all over, with branny desquamation. The legs and feet appear somewhat infiltrated, but there is no pitting; the hands are broad and coarse, with thick fingers; the pulp of the finger tips is very noticeably wasted and the finger nails are firm and very rounded.

The temperature is subnormal; it has dropped as low as 95°, but is usually 97° to 98°. The blood pressure is 110 to 115 with a diastolic of 95; the arteries are soft; the heart, normal with a rate about 72, though sometimes dropping considerably below this figure; lungs normal; teeth satisfactory; tongue rather large; considerable fat on abdominal wall; liver and spleen not palpable and abdominal examination negative; testes normal. The urine varies in specific gravity from 1010 to 1020; no albumin or sugar, and microscopically negative.

The speech is slow, thick and indistinct; the man is definitely slightly deaf; the knee jerks are active and there is a double flexor response; the ankle jerks are singularly sluggish on both sides. In spite of the history of numbness, there are no very definite sensory changes demonstrable in the legs; the joints and the spine are normal. Pulsation of the peripheral arteries is everywhere normal.

Diagnosis.—Without the help of any special examinations, the diagnosis is obvious; the history alone is highly suggestive. Here is a middle aged man who gradually loses strength, becomes unduly susceptible to cold, suffers from poor memory, hard hearing, clumsiness of the legs and obstinate constipation. When to this history is added the expressionless, somewhat renal-looking, appearance of the patient, with very cold skin, the diagnosis of myxœdema is practically assured. The loss of hair is usually much more marked than in the present case.

Special tests.—The blood showed: 4,950,000 red cells, with 85 per cent hæmoglobin and 9,500 leucocytes, with 57 per cent polymorphonuclears, 36 per cent small lymphocytes, 3 per cent monocytes, 3 per cent eosino-

philes and 1 per cent basophiles. The Wassermann test was negative; blood urea nitrogen 15 mg. and blood creatinine 1.5 mg. per 100 c.c. of blood. The phenolsulphonephthalein test showed 33 per cent of the dye excreted in first half hour, 7 per cent in second half hour, but only 5 per cent in the second hour. The test meal was normal. Examination of ears showed the deafness to be due to changes in both middle and internal ears. The basal metabolic rate was −34 per cent.

I should like to emphasize that while it is satisfactory to have these special tests in confirmation, the diagnosis was made before the tests were taken. This is possible in a large number of cases of myxœdema, where a careful history is often of more value than even the basal metabolic rate. Our modern teaching exalts laboratory methods and laboratory diagnosis at the expense of the old painstaking history and physical examination, with often disastrous consequences to the patient. A diagnosis of myxœdema, implying, as it does, atrophic changes in the vesicles of the thyroid gland, with decrease or absence of the secretion thyroxin, should never be made on the ground of a low basal metabolic rate, without the corresponding clinical picture. Such a low rate may occur also in emaciated conditions generally and in nephrosis without the characteristic pathological changes in the thyroid.

In differential diagnosis, renal disease and sometimes pernicious anæmia may be considered. A trace of albumin, with rather low specific gravity urine, is not uncommonly found in myxœdema, and the infiltrated legs of myxœdema may pit a little on pressure (though usually the œdema is solid and does not pit), yet none of the other indications of renal disease are present, while the clumsy walk, deafness, poor memory, etc., are unexplained by a diagnosis of nephritis. Pernicious anæmia may bear a superficial resemblance to myxœdema, especially as in the latter there may be marked numbness of the legs and even absence of free hydrochloric acid after a test meal, but careful examination of the blood (necessary only in the exceptional case) will at once settle the diagnosis. In the present case, free hydrochloric acid was present after a test meal—a finding which in itself excludes pernicious anæmia, even in the early stage.

But the diagnosis of myxœdema is usually overlooked, not because a very positive diagnosis of some other disease is made but simply because this disease is not thought of. Myxœdema is not seen every day, and, unfortunately, the ductless glands are not considered in a routine way during an ordinary physical examination. A marked example like the present case suggests at once the proper diagnosis, but less developed types are bound to be overlooked, until we come to consider the ductless glands in every examination.

For some years, I have tried to form the habit of regularly examining the thyroid just before passing to the examination of the heart and lungs and of allowing, while so engaged, the possibility of hyperthyroidism, hypothyroidism and tetany, to pass in mental review. Some such routine is very necessary and will bring, *e.g.*, many a hitherto unexplained rapid heart action under its proper caption of hyperthyroidism, while a stray case of tetany will be recognized when indefinite cramps of the extremities are complained of.

In myxœdema, the fires of life are burning low—the temperature is subnormal, the skin is cold and very dry, the pulse pressure is low, physical and mental power is reduced with memory affected, acuity of sight and hearing is subnormal, precision of hand and foot is impaired. In some cases, "rheumatic" pains in the joints and muscles of the legs, or obstinate neuralgic pains in the back, dominate the picture and the underlying myxœdema is long overlooked; I have personally seen several such cases, the "rheumatic" pains subsiding quickly under appropriate treatment with thyroid. In still other cases amenorrhœa or menorrhagia may bring the patient to the physician, who is then apt to treat the condition locally, without suspicion of the thyroid origin of the leading symptom.

Etiology.—Myxœdema is much more common in women—of 32 private cases I have notes of, 8 were in males and 24 in females, but larger statistics give the proportion of 1:6 or more. The age is usually between 35 and 50 years. An occasional case follows operation, but it is surprising how seldom this occurs, in spite of the modern operation of subtotal thyroidectomy. Only very exceptionally is there a history of preceding thyroiditis; in some, there is a history of goitre, and the gland may still be enlarged; in the great majority, however, there is no indication why the thyroid became insufficient.

TREATMENT

The treatment of myxœdema is very satisfactory, but requires reasonable care on the part of the physician and loyal cooperation by the patient. One has first to restore the patient to approximately the normal level of metabolism by means of thyroid gland preparations or thyroxin, and then to continue indefinitely the minimum dose necessary to maintain the patient symptom free.

The active principle of the gland, found to contain 65 per cent of iodine, was isolated in crystalline form in 1914 by Kendall of the Mayo clinic and was given the name of thyroxin. Its exact chemical formula was worked out some years ago by Harrington, of England, and the substance successfully synthesized by him. It has been urged by a few that thyroxin, as being of known strength and thus permitting accurate measurement of the dose when the basal metabolic rate is known, should be used regularly in the treatment of myxœdema. But however useful thyroxin may be in clinical research, it is inferior to thyroid preparations in the ordinary treatment of myxœdema. Thyroxin is uncertain in action, when given by the mouth, is apt to cause pain if given subcutaneously, and when given intravenously may give rise to unpleasant reactions in the shape of fever, headache, nausea, pains in the back and in the joints, increase of pulse rate, while the rapid rise of metabolism following involves a correspondingly rapid adjustment of the circulation with possible cardiac weakness. So one of the thyroid preparations is preferable. Personally, I have used Burroughs Wellcome & Co.'s Tabloid of Thyroid Gland which contains not less than 0.2 per cent of iodine in organic combination, but Parke Davis & Co.'s Thyroid Gland (which has 0.3 per cent of iodine and so should be 50 per cent more powerful) is said to be equally satisfactory; Armour & Co.'s thyroid has 0.2 per cent of iodine. One-half of a 5 grain tabloid of thyroid gland (B. & W.) may be given night and morning, or, if the patient be under strict observation, three times a day. Such a dose can usually in a marked case be continued 7 to 10 days, sometimes for 2 or 3 weeks, though the patient has usually begun to feel warmer with a moister skin and to be brighter mentally after 3 or 4 days. The pulse rate, while the patient is still in bed in the mornings, is a good guide against overdosage and should not rise above 75 to 80; there should be no complaint of palpitation, precordial pain, nausea or dizziness. Any such symptoms call for cessation of the drug and its resumption in a couple of days at a maintenance dose, which on an average may be 2 grains daily.

No doubt, where basal metabolic readings can be readily obtained, it is wise during the early treatment to control the dosage by a metabolic test every few days. Personally, I have but rarely found this convenient and have been guided simply by the clinical progress of the patient. After all, some patients are symptom-free with a basal metabolic rate of –10 or even lower, and develop symptoms of overdosage if thyroid be pushed when they reach this level; others may with advantage have their metabolism raised to plus 5 or over. The absence of symptoms, rather than any fixed level of metabolism, is the aim of treatment.

Marked anæmia or cardiac weakness—which may complicate the picture of myxœdema—calls for absolute rest in bed and a smaller initial dose of thyroid, the effect of which must be carefully watched every day. A preliminary blood transfusion or exhibition of digitalis may be necessary in such cases.

The patient should, of course, be under close supervision until all clinical symptoms have disappeared and until the proper maintenance dose, which varies in the individual case, but which usually lies between 1 and 5 grains, has been arrived at. He should be instructed to report at once if he begins to suffer from palpitation, pains in the heart, nausea or nervousness —indications for temporarily omitting thyroid, with resumption at a smaller dose. Those suffering from spontaneous myxœdema have almost always to continue the maintenance dose through life and should report every six months at least.

It is surprising how often, in spite of the brilliant transformation effected by thyroid medication, and in spite of explicit warnings by the physician, the patient, after months or years, becomes careless, stops the thyroid extract or uses an insufficient dose and lapses into the old vegetative existence. The most marked example of myxœdema I have seen, occurred in a medical man, who walked into my office, quite

bald, and with every book sign of the disease. Under thyroid, he rapidly improved and I lost sight of him for a couple of years, when he re-appeared in charge of friends, again deeply myxœdematous, but now with marked mental symptoms. Thyroid treatment again cleared both the myxœdema and the associated psychosis.

NOTE.—The patient was kept in hospital for three weeks under thyroid treatment. For the first two days he was given thyroid gland gr. 5 daily and then gr. 7½ daily for the next sixteen days. Within four days, the feet felt warmer and the fingers and toes more supple; he perspired freely at night for the first time in many years. Within a week he noticed his lips were not so swollen and the tongue was not so "stiff" in speaking. In the second week, his hair was not so bristly and lay down readily on brushing it; his beard grew faster; the finger nails which had been so brittle that they "broke like glass" became not so dry and brittle; the infiltration below his chin disappeared and the renal appearance of his face became much less obvious, while his nose was obviously thinner; his hands had been extremely thick and became more slender; he lost 8 pounds in weight; his memory improved, his expression lost its stolid, apathetic type; his general sense of well-being improved and his spirits rose. Coincident with these changes, the basal metabolic rate rose from –34 per cent on admission, to –21 per cent in eight days and to –3 per cent ten days later. Throughout treatment he complained only of slight occipital headache and stiffness of the back of the neck in the morning; the pulse rose to 80 in the morning and he was very slightly dizzy at the end of eighteen days' treatment; the dose was then reduced to grs. 2½ daily, on which he was allowed to return home.

It is naturally impossible to say the exact maintenance dose which will be required. The patient is to keep in touch with his own physician who has been communicated with and he understands that thyroid extract has to be continued indefinitely.

Case Reports

A CASE OF HÆMANGIOENDOTHELIOMA OF THE BONES OF THE WRIST*

BY J. E. PRITCHARD, M.D.,

Montreal

A man, 30 years of age, came to the out-patient department of the Montreal General Hospital in December, 1926, complaining of soreness and swelling of the right wrist. In November, 1926, he injured his right wrist while cranking a car. A week later he fell upon the same hand and soon afterwards the wrist became swollen and painful. When he came to the out-patient department the right wrist was markedly swollen and tender and the right hand was adducted. A radiograph showed a fracture of the greater multangular and the styloid process of the radius, and rarefaction of the lower end of the radius, the trapezium, scaphoid and first metacarpal. The possibility of a pathological fracture was discussed at that time. The hand was put in plaster. The patient was seen again nine weeks later, when swelling and adduction were more marked and a radiograph showed destruction of bone in the lower end of the radius and some of the carpal and metacarpal bones. On several visits after this the condition showed no improvement.

In October, 1927, eleven months after the injury, he again reported. At this time the swelling and deformity were more marked and the destructive process had increased, particularly in the lower end of the radius, where a tumour had greatly distended the bone, destroyed the cortex, and had broken through the periosteum. Throughout the tumour was considerable irregular bony trabeculation (see Fig. 1).

The patient was then admitted to the surgical service of Dr. A. T. Bazin. His general condition was good. At no time during his stay in the hospital, which covered the period from October, 1927, to January, 1928, was the temperature elevated. There was a large firm swelling of the lower end of the right forearm, wrist and proximal part of the hand, more marked on the radial side, causing considerable adduction of the hand. The swelling was somewhat irregular in contour. It pulsated syn-

* From the Department of Pathology, the Montreal General Hospital.

chronously with the radial pulse, and there was increased vascularity of the wrist and hand. The skin was quite moist. Pain was continuous. The fingers moved freely, but movements at the wrist were very limited and painful. There was no obstruction of the venous return from the hand. In the skin on the lateral aspect of the wrist were two small bluish papules. A large soft lymph-node was palpable in the right axilla, and another in the epitrochlear region. One

FIG. 1.—Radiograph showing destruction of the lower end of radius by the tumour. Note the fine bony trabeculæ in the mass.

removed for biopsy showed hyperplasia, great dilatation of the lymph-sinuses and much blood pigment, but no tumour. Blood counts and blood chemistry were normal and the urine was negative. A bone tumour, probably Ewing's endothelial myeloma, was diagnosed and x-ray treatments instituted. Three treatments, totalling 800 R units, were given during a period of seven weeks, at the end of which time there was no apparent response. He was sent home on November 4th to await the results of this treatment. On his return on December 9, 1927, a month later, there was no improvement in his condition, but rather an increase in the size of the tumour, with more discomfort, more engorgement of the veins and more palpable lymph nodes in the arm.

Physical and x-ray examination of the whole body showed no evidence of metastases. His general condition was excellent. On December 30, 1927, an amputation was done through the lower third of the forearm.

PATHOLOGICAL FINDINGS

The specimen externally was as already described. A longitudinal section through the lower end of the radius and carpal bones revealed a large reddish brown fleshy tumour mass, involving the lower end of the radius, the carpal and metacarpal bones, and the surrounding soft parts (see Fig. 2). The tumour was

FIG. 2.—Gross specimen which has been cut open from the radial side as far as the flexor tendons and opened out. Note the tendons in the centre with the lobulated tumour mass on each side. The intact lower end of the shaft of the radius can be seen at R.

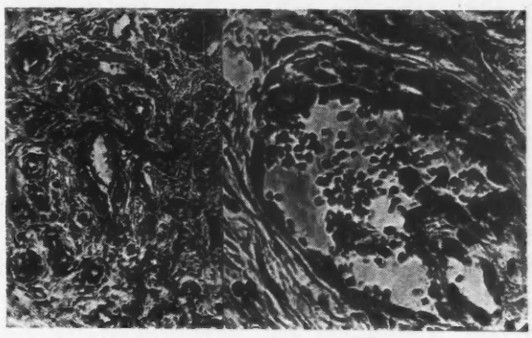
lobulated, particularly at its periphery, and in the soft parts about it there was quite a dense fibrous-tissue reaction. The tendons were pushed over, the outer portions of their sheaths were involved where the tumour came in contact with them, but the tendons themselves and the inner surfaces of their sheaths were quite free. On the sheath of the flexor digitorum sublimis was a small nodule, similar to the rest of the tumour, but quite separate from it.

The tumour involved the lower 5 cm. of the radius. Its upper margin was sharply demarcated. The cortex on the medial side was intact and the radio-ulnar joints and ligaments were not involved. On the lateral aspect this bone was expanded and the tumour had destroyed the cortex and broken through the periosteum. The articular surface of the radius was in part broken down, and the new growth had extended along the ligaments between the carpal bones.

The joint cavity between the navicular and greater multangular bones was filled with a tumour cast. The articular cartilages were intact, but the involved bones were extensively infiltrated. The tumour extended along the second metacarpal to its distal end and there was a small brownish neoplastic nodule in the proximal phalanx of the second digit. In the first metacarpal the new growth extended about half-way down. The finer structures of the tumour showed varying-sized irregular, reddish brown, meaty nodules imbedded in a fibrous tissue stroma, and containing spicules of bone. When the papules on the skin were dissected, they were seen to be in the subcutaneous tissue and skin. They were not directly connected with the tumour mass beneath them.

Microscopically, the tumour everywhere presented the same general structure. Under very low power it was seen to be composed of lobules separated by bands of connective tissue which was quite vascular and showed a variable infiltration with plasma cells, lymphocytes, and eosinophiles, and a considerable deposition of blood pigment. Bone replacement was complete in the central portion of the new growth, whilst at the periphery it was marked by great distension of the Haversian canals by tumour, with atrophy and dissolution of the trabeculæ. In the connective tissue at the periphery of the growth there were irregular strands of new bone, apparently of a reactive nature, being laid down from the periosteum and not from the tumour.

A low-power view of the centre of a lobule showed a plexiform vascular mass of poorly formed capillary vessels. In some places it was very cellular and the vessel lumina were small and indistinct; in other places the vascular spaces were collapsed by profuse interstitial hæmorrhage presenting the appearance of a hæmorrhagic mass, with sparsely scattered endothelial cells and scanty stroma. This interstitial hæmorrhage accounts for the blood pigment in the lymph nodes of the arm. At the periphery of a lobule (see Fig. 3A) the vascular nature of the tumour was more evident. There the differentiation into blood containing capillary vessels lined by endothelium was quite evident. In the same field there were solid whorls of tumour cells representing epithelial buds which had not yet become canalized. In numerous capillaries endothelial proliferation was revealed by stratification of cells, invasion of surrounding tissues, and papilliferous projections into the lumina of the vessels and tumour cells free in the blood channels (Fig. 3 B). Mitotic figures



A B

FIG. 3

A. A low power microphotograph at the periphery of a nodule. In the centre is a well formed vessel about which are numerous less developed vessels and solid cords of cells which have not yet become canalized.
B. A high power view of a vessel showing above endothelial hyperplasia and infiltration, and at the right a papilliferous structure covered by large hyperchromatic cells.

were very scanty, but anaplasia and hyperchromatism were marked. A section through one of the nodules in the skin showed neoplastic tissue similar to that in the bones.

It is obvious that this tumour is a hæmangioblastoma showing evidence of malignancy. The Committee of the Bone Sarcoma Registry of the American College of Surgeons, who divide the angioblastomas of bone into the benign angiomas and the malignant angioendotheliomas, have classed it as an angioendothelioma.

COMMENT

Angioblastomas of bones are admittedly uncommon. In a series of 290 tumours of vascular origin reported by Pulford[1] of the Mayo Clinic not one occurred in bone. In another series of 1,000 bone tumours from the Bone Sarcoma Registry of the American College of Surgeons, reported by Christenson[2] in 1925, there were only 8 angiomas and no angioendotheliomas. In Kalodney's review[3] of the Registry cases in 1927, he classified only two tumours as angioendotheliomas.

Recently I have had the privilege of studying the Registry cases of vascular tumours of bone. Fifteen were submitted. Of these 2 are doubtful and probably are not bone tumours.

Of the remaining 13 cases, including the one above reported, which bears the registry number 1040, 7 were benign angiomas and 6 were angioendotheliomas. Of the 7 benign angiomas, 6 were of the cavernous type and 1 was of the capillary type.

The angioendotheliomas, with the exception of that reported above, were all moderately anaplastic and very cellular. Our case, histologically, resembles in great part the benign capillary angioma, but also shows unmistakable features of angioendothelioma. The radiographs also showed characteristics of both a benign and malignant tumour. Irregular trabeculation of the benign angioma is clearly seen in Fig. 1. At the same time the penetration of the periosteum and articular surface with extension in neighbouring bones and soft tissues indicates malignancy.

This tumour, though malignant, is very much more differentiated than the other cases of angioendothelioma in the Registry and is therefore probably less malignant.

The patient is still alive and well over three years since amputation was done, and over four years since the commencement of the new growth.

REFERENCES
1. PULFORD, *Ann. Surg.*, 1925, 88: 710.
2. CHRISTENSON, *Ann. Surg.*, 1925, 81: 1074.
3. KALODNEY, *Surg., Gyn., & Obst.*, (Supplementary number), March, 1927.

A PROBE IN THE CRANIAL CAVITY FOR SEVENTEEN YEARS

BY J. S. MCEACHERN, M.D.,

Calgary, Alta.

Case No. 5-11143.—On November 17, 1925, a single man, aged 33, presented himself complaining of attacks of "fits".

History of illness.—In October, 1908, he was shot in the head with a shotgun. There was a great deal of damage to the frontal bone. The right eye was destroyed and had to be enucleated. As a result of this injury he was ill for 132 days. In February, 1910, he had a "fit". Just before it came on he found that his head rotated to the right. He was unconscious after the fit for from twenty minutes to half an hour. After the attack was over he was very sleepy for some time. It was impossible to secure any information as to what group of muscles, if any, showed twitching at the onset of the attack, other than the tendency of the head to rotate to the right. He did not bite the tongue or lips, nor did he lose control of the sphincters.

For the next eleven years he had a similar seizure every four or five months. For the past four years he has had an attack every three or four weeks. He had had mental irritability and outbursts of temper on the day preceding the fit at times. He had never had much headache. Ever since his head injury he had had complete loss of the sense of smell, and had had some catarrhal discharge from the nostrils. The period of disability resulting from his seizures is no longer now than it was following the earlier fits.

Physical examination.—The man was well nourished. Nothing abnormal was found in any of the systems. Examination of the head showed marked scarring of the forehead. There was a depression at the lower part of the forehead, just to the right of the middle line, where there was some loss of bone. The skin and the scar tissue were adherent to this depressed area. An x-ray picture of the head accompanies this report. It shows the shadow of a probe in the cranial cavity. The eye of the probe lies against the scar tissue filling the bony defect. The probe passes from this point upward and to the left.

FIG. 1

On November 19, 1925, he was admitted to the Holy Cross Hospital. On the next day,

under ether anæsthesia, a horse-shoe flap was turned down, uncovering the bony defect in the skull. The end of the probe could be felt projecting against the scar tissue, which filled the defect. An incision was made on the end of it. This released a quantity of clear fluid from a cyst, which had formed around the probe. The flattened metal which formed the eye was so oxidized that when grasped in a hæmostat it crushed like chalk. This occurred repeatedly until a grasp was secured on the thick portion beyond the eye. The probe was then withdrawn. It was heavily encrusted with lime salts. The opening in the scar tissue closing the bony defect was sutured with catgut. The skin flap was replaced without drainage, using silkworm gut sutures.

The subsequent course while in hospital was uneventful. The patient was allowed out of bed on the seventh day and discharged on the tenth day. He was given a bromide mixture and instructed to take it for two years. Reports were received from him from time to time stating that he was quite well and working steadily. In May, 1930, he came to my office. He stated that he had kept up the bromide for three years. He then stopped taking it. He remained well until the previous day when he had another fit. He was instructed to begin the bromide mixture again.

One can only speculate about how the probe came to be left in the wound at the time of his injury. The physician who attended him at the time died some years ago.

A CASE OF LEPROSY*

BY B. USHER, M.D.,

Montreal

There is a two-fold interest in this report. Leprosy is rare in Montreal, the last reported case having been observed in 1925.[1] This case report is of additional interest because the patient presumably contracted the disease while on active service in France during the Great War.

The patient, a male, aged 38, presented himself at the Dermatological Out-patient Department of the Montreal General Hospital in June, 1930. His chief complaints were "a skin eruption and numbness of the extremities."

Previous history.—He was born in Capetown, South Africa, in 1892. At the age of four years he came to Canada, where, with the exception of four years' war service in France, he has been ever since. In 1914 he went to France with the 13th Battalion, and one of his first duties was to oversee Chinese laborers. No other source for his infection could be determined. Early in 1915 he developed a chill with fever and with swelling of the feet, soon to be followed by joint pains. About five months later he noticed numbness in the left foot, which gradually became worse, until the entire lower extremity was involved. By this time the joint pains had cleared up. At this time, too, the right side was still unaffected. For the next twelve months he was moved about between various hospitals with little change in his symptoms. His discharge certificate, given in 1919, stated he was suffering from "limitation of movement distal joint left hand". He was not recommended for pension and made no attempt to obtain one.

Skin lesions were noticed first in 1919 as bullæ which appeared symmetrically on the fingers of both hands, as many as a score being present at one time. These would come and go, finally being replaced by nodules. At the present time bullæ do not precede the appearance of the nodules. Attacks of numbness and swelling of the extremities have persisted. There has been a gradual appearance and development of deformity of the fingers. The nodules have increased in number and in size, gradually extending up the extremities. The face and ears became affected about the time of his discharge from the army. With the exception of frequent nose bleeds he has had excellent health and has been able to maintain his family at his trade, that of a printer.

Physical examination.—With the exception of the tegumentary system, physical examination revealed nothing of importance.

The main feature of the eruption consisted in

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* From the Department of Dermatology, the Montreal General Hospital.

nodules varying in size from 0.3 cm. to about 4 cm. in diameter. Their colour was reddish-brown. The forehead was thickened and nodular with the folds exaggerated; the eyebrows enlarged and prominent; the nose thickened and flat; the ears enlarged and roughened. This gave him the typical leonine facies.

The eruption was especially profuse on the fingers, hands and forearms, a diffuse infiltration being present over the dorsum of each hand. No ulceration could be seen. The fingers of both hands presented a bluish appearance, with moderate limitation of movement of the joints. The thumb nails were partly absent and the remains deformed. The nails of the big toes were also deformed. There was only moderate limitation of movement of the joints of the feet. Nodules similar in character to those on the hands, but of a much lesser degree, were present. The remainder of the body presented no nodules. Diffuse patches of light brown pigmentation could be seen on the trunk, very slightly marked about the arms and shoulders.

FIG. 1.—Section of skin showing nodular masses in the corium. Low power magnification.

Motor power development, nutrition and tone were normal, except for flattening of the thenar eminences. There was definite impairment of sensation, as tested by cotton and pin, and of the sense of position of the arms and legs, more marked distally. This could be in part attributed to the trophic disturbances in the skin, but a mild degree of peripheral neuritis was definitely present. The ulnar nerves could not be palpated.

The blood Wassermann test was positive. Nasal smears showed the presence of acid-fast bacilli having the morphology of lepra bacilli.

Sections obtained from an acute lesion on the forearm revealed the typical picture of leprosy (Figs. 1 and 2). Throughout the cutis vera, and extending into the subcutaneous tissue, were irregular nodular masses, composed of densely packed cells in a diffuse fibrous reticulum. The cells were fibroblasts, lymphocytes and very numerous large endothelioid cells, the so-called "lepra cells". Neither giant-cells nor caseation could be seen. The individual nodules were separated by bands of connective tissue, which in places showed slight round-celled infiltration. Sections stained with carbol-fuchsin showed enormous numbers of acid-fast bacilli, for the most part packing the large endothelioid cells.

When the diagnosis of leprosy had been made, the patient was removed to the leprosarium at Tracadie, N.B., for treatment.

It is also satisfactory to note that the Board of Pensions Commissioners of Canada has granted the patient a satisfactory pension.

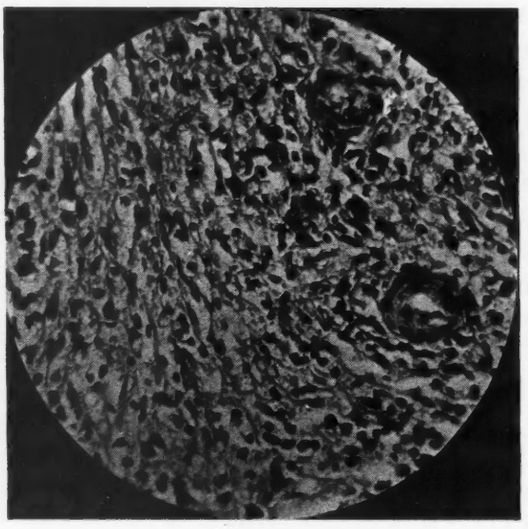

FIG. 2.—High power magnification of Fig. 1; type of infiltrate.

I wish to thank Dr. L. J. Rhea, Director of the Department of Pathology, for his aid in preparing this report, and Dr. J. F. Burgess, Dermatologist to the Montreal General Hospital, for the privilege of reporting it.

REFERENCE

1. BOURNE, *Canad. M. Ass. J.*, 1926, 16: 395.

THE TREATMENT OF A CASE OF ADDISON'S DISEASE WITH THE CORTICAL HORMONE OF SWINGLE AND PFIFFNER*

BY RALPH G. BALL, M.D., AND JOHN LANSBURY, M.D.,

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The last few years have witnessed a steady progress in the isolation of the active principles of various endocrine glands. These extracts have been used with varying degrees of efficiency in the control of the several diseases arising from deficiency in function of the glands concerned. The suprarenal gland has in the past presented a rather unique problem, in that its active principle, epinephrine, although one of the first autacoids to be isolated, has nevertheless been ineffective in the control of cases of suprarenal insufficiency. In 1921 the Muirhead treatment for Addison's disease was developed, and since that time has been used at The Mayo Clinic with a certain degree of success. Approximately a third of the patients so treated show considerable improvement, whereas excellent results (the maintenance of life for one or more years) occurs in approximately a sixth of the cases. One patient is living twelve years after the onset of symptoms, and seven years after the commencement of the Muirhead regimen.

Efforts have long been made to solve the problem of treating Addison's disease by the substitution of extracts of the suprarenal cortex, but with rather indifferent results. Hartman and his coworkers, in 1928, obtained a cortical extract with which they were able to maintain the life of suprarenalectomized cats sixteen to seventeen days beyond the span of life of untreated suprarenalectomized animals. Stewart and Rogoff, in 1929, reported a preparation of an extract of the suprarenal glands of cattle and sheep, which, when injected intravenously, prolonged the life of suprarenalectomized animals. Swingle and Pfiffner, in 1930, reported the lipid extraction of a cortical hormone which when injected intravenously prolonged the life of suprarenalectomized cats indefinitely. This extract was sufficiently potent to make possible complete replacement therapy by suprarenal cortex in acute suprarenal insufficiency in experimental animals. The case reported here is the ninth case of Addison's disease which has received treatment at The Mayo Clinic with the cortical hormone of Swingle and Pfiffner.

A man, aged twenty years, was admitted to the clinic December 31, 1930, complaining of weakness and increased pigmentation of the skin. Between the years 1925 and 1928 he had been exposed to tuberculosis. He had had measles and rheumatic fever in infancy. He remembered in 1925 having tried to whiten his skin by the use of lemon juice, because it was "a dirty brown colour." In August, 1928, he noticed that his skin was unusually pigmented. He thought this was due to sunburn; he was doing heavy manual labour at the time. Within the next month he noticed marked diminution of strength. He was able to continue his work, but at school he became progressively more tired and weak. His summer tan did not fade. In spite of a ravenous appetite he did not gain weight. He was increasingly tired, and, although he slept thirteen hours a day, he was drowsy and exhausted after 3 p.m. daily. He managed to take part in sports and passed his examinations in the spring. The next summer, in 1929, symptoms increased. A dry cough developed and continued, and there was once a question of hæmoptysis. At this time a craving for salt and for olives developed, especially when he was feeling fairly well. In July, 1929, the patient became seriously ill, complaining of tachycardia, anorexia, vomiting and constipation. He was prostrated, and "went out of his mind." His physician diagnosed Addison's disease and pulmonary tuberculosis. He improved slightly, although the weakness and pigmentation persisted in varying degrees. The young man returned to school in the autumn, and was able to pass his examinations in spite of the presence of symptoms which he had had the previous year.

In February, October and December, 1930, he had periods of great prostration. At times he was too weak to sit up in bed. He had

* Case observed under the direction of L. G. Rowntree, Division of Medicine, the Mayo Clinic.

marked anorexia, vomiting and diarrhœa. His voice was husky; he had marked tachycardia and dyspnœa on exertion, and was at one time sleepless for ten days. In this last exacerbation he lost 15 pounds in weight. For the last three years libido had been almost absent. The beard was scanty; he shaved once in two weeks. For one year there had been swelling and tenderness of the breasts at intervals of about six weeks. He had been troubled with hæmorrhoids for two years, and had lost several ounces of blood from the rectum at a time.

The skin was a light olive with dark brown mottled areas on the exposed surfaces, the pelvic girdle and extensor aspect of the arms. The nipples were almost black, and the genitals and anus were deeply pigmented. There were a few scattered freckles, and some pigmented areas on the palms, soles, and buccal mucous membranes. The skin was smooth and unwrinkled and of a silky texture. The hair of the pubes and axilla was normal. The pupils were widely dilated and there was slight lid-lag. The tonsils and teeth were moderately septic. The heart was of normal size; the sounds were faint. The pulse was regular, soft, and at times almost imperceptible. The blood pressures were 82 and 60. Examination of the thorax disclosed signs of increased density in the right upper lobe of the lung. Examination of the rectum revealed external hæmorrhoids. Roentgenograms of the region of the kidney disclosed bilateral calcification over the suprarenal areas. Roentgenograms of the thorax disclosed old tuberculous lesions of the upper right lobe of the lung. The urine contained many hyaline casts, but was otherwise normal. Slight leukocytosis with eosinophilia was noted. The blood Wassermann reaction was negative. The blood urea was 66; creatinine 1.4; sugar 100; and chlorides 676 mg. in each 100 c.c. The basal metabolic rate was + 5 per cent. A test meal showed achlorhydria. Repeated examinations of the sputum, urine and stool showed the presence of atypical acid-fast bacilli in stools and urine.

The second day after the patient's admission, he was drowsy, and weaker. His appetite was poor, and he was nauseated. The pulse was rapid and almost imperceptible. The water balance showed retention of 2,000 c.c., and his weight suddenly increased 4 pounds. The blood chlorides rose to 718. The carbon dioxide combining power of the plasma was 46.6, and the blood urea was 56. At this point, treatment was started with Swingle and Pfiffner's cortical hormone. Sixty-three cubic centimetres were given intravenously over a period of 5 days. Improvement was immediate, beginning after the first day of treatment, and progressed with each succeeding day.

After the course of treatment there was a definite decrease in pigmentation, the patient felt well, his appetite was normal, and his energy was so good that it was difficult to keep him in bed. Blood pressure and weight were unchanged, but the pulse was stronger; the rate had dropped to normal. Following this the patient was given 15 grains of suprarenal cortex by mouth daily. Under this regimen he continued to improve for the next week. He made a slight gain in weight, his craving for salt had disappeared, and his memory was improved. The blood and urine were normal.

About the twelfth day after the course of cortical hormone the patient had a slight cold, and he did not feel or look so well. A slight increase of pigmentation was noted. Another course of treatment was begun, and over a period of eight days he received 47 c.c. of hormone intravenously. Improvement occurred as before, all symptoms disappearing. He was dismissed from hospital feeling perfectly well, having had 110 c.c. of Swingle's extract in all. Until the next period of observation, 10 days later, he took 15 grains of cortical extract daily by mouth. The pigment had further decreased. The patient had gained 13 pounds in weight since the first admission. He was in excellent health and spirits and was able to walk four miles without fatigue. His appetite was good, his bowels were regular, and his beard had started to grow faster. The blood pressures were 105 and 68; the blood and urine were normal. During the interval he had had two teeth extracted without any untoward symptoms.

An arrangement has been made for the patient to spend the summer at the sanatorium at San Haven, North Dakota, and in the autumn he intends to study at a state teachers'

college, where he will be under medical supervision.

COMMENT

This patient improved remarkably following treatment by the cortical hormone of Swingle and Pfiffner. The patient withstood a minor operation without untoward effect, which is almost unknown in severe cases of untreated Addison's disease. Roentgenograms disclosed calcification in the suprarenal areas, a condition which to our knowledge has been previously reported only once,* and which may be considered an important diagnostic aid. The craving for salt seems to be a specific manifestation of the disease; we have observed it in two other cases. The high blood chlorides during the period of collapse were worthy of note. The results of treatment have been so satisfactory that the patient is being sent home with definite plans for his future career.

* Rolleston and Boyd, Addison's disease in a boy, with calcification of the adrenals, with remarks, *Brit. J. Dis. Child.*, 1914, **11**: 105.

Editorial

THE BACTERIOPHAGE PHENOMENON

THE phenomenon known as bacteriophagy has attracted general attention during recent years, for two reasons. In the first place the phenomenon is worth studying for its own sake. Who can guess the extent to which our knowledge of life might be increased and what paths might be opened for investigation by the solution of the problems of bacteriophagy? In the second place, interest is aroused by the hope, and a few consider it a certainty, that in bacteriophagy will be found an omnipotent and manageable agent for the prevention and cure of bacterial infections. At the moment bacterial infections are largely beyond our control. The few exceptions, standing out in relief from a background of failure, are the first tottering steps in long and difficult researches. In the early days of their success antitoxins and active immunization with suitable bacterial vaccines were surrounded with a glamour of exaggerated hope; to-day their importance is in no wise diminished, but their limitations are better defined, their complexity is recognized, and the principles underlying their production and action are the subjects of intricate investigations. Thus with greater knowledge we learn to arrange the mosaic of our conception of the scheme of things and, when relieved of disproportionate ideas of their importance, our observations fit smoothly into the pattern. So, in the course of time, bacteriophagy will conform to rule and find its level.

It is generally held that the phenomenon was first recognized and described by Twort[1] (1915), and in this paper he indicated the various theories which might account for his observations, without committing himself to any one. Each of these theories has since been expounded independently by other observers. Twort's paper did not get the recognition it is now known to have deserved, but the rediscovery of the phenomenon by d'Herelle[2] (1917), and the vast amount of work he has done since, have now attracted universal attention. d'Herelle denies the identity of Twort's phenomenon and bacteriophagy, and to explain the observations of Gratia[3] and others he maintains that they may have a coincident existence. However, it is widely accepted that Twort and d'Herelle each described the same thing.

It is now agreed that bacteriophagy is due to a particulate or corpuscular agent thought to be about 0.02 micron in diameter, a size approximating to the theoretical limit of visibility. The evidence for this belief is due to d'Herelle, who has also shown a discontinuity in the early stages of multiplication of these particles, which he regards as strictly parasitic autonomous living organisms, with a genetic relationship between

1. TWORT, *Lancet*, 1915, **2**: 1241.
2. D'HERELLE, *Comptes Rendus Acad. Sci.*, 1917, **165**: 373.
3. GRATIA, *Ann. Inst. Past.*, 1931, **46**: 1.

successively produced particles, and capable of remarkable adaptation, whereby, in his opinion, they form different races of a single species.

In opposition to this view it is held that the lytic particle is derived from the bacterial cell in a manner explained by some seven different theories, involving highly technical considerations, which are very clearly set out in a recent review of the whole subject by Burnet[4] (1930). Although all the observations related to bacteriophagy are most comprehensively explained by the living parasite theory, and with the least straining of probabilities, it is nevertheless true, as Burnet points out, "We can still discuss whether the quasi-independent living unit, bacteriophage, is analogous to the spirochæte or to the malignant cell."

Bacteriophage, varying greatly in activity, is very widely distributed in nature. "Phages" can be demonstrated in the intestinal contents of almost all vertebrates, and mixed sewage is invariably a source of phages of widely differing activities. Phage can be found widely distributed in surface waters and it has been considered an important factor in the self-purification of rivers. In this connection it is interesting to note that Hankin, in 1896, described an active bactericidal action of the filtered water of the River Jumna which was destroyed on boiling it and which he thought, on that account, was due to a volatile antiseptic.

It is claimed that during intestinal infections and certain other diseases the natural bacteriophage develops an increased activity against the infecting organism, and d'Herelle holds that the progress of certain diseases (*e.g.*, dysentery, cholera, plague) is determined by this activity of bacteriophage. This view cannot be accepted, nor is it possible to assess, at the present time, the true significance of phage in disease. In the opinion of many, the clinical reports of successful therapeutic use of phage are insufficient and uncritical; but where the reports have denied a therapeutic action to phage they have been scornfully treated by d'Herelle and his supporters and explained away by saying that the phage used was not of maximal activity. In a recent address to the Montreal Medico-Chirurgical Society, d'Herelle was unduly scathing in his criticism of a paper by Riding[6] (1930) which gives a critical and careful investigation of the action of phage in bacillary dysentery. Riding obtained no evidence of improvement in cases by the use of phage and demonstrated that the bacilli in the stools were not diminished, even though the strain isolated from the cases was readily lysed by the phage he used. In laboratory investigations of experimental epidemics in animals phage has given consistently negative results (Topley *et. al.*[7], 1925).

It has been shown (Appelmans[8], 1921) that the phage rapidly disappears from the blood stream and that contact with leucocytes removes its activity (Bruynoghe and Maisin[9], 1922) and, though resistant to gastric juice, it is rapidly destroyed in the body after it is taken by the mouth (Riding, 1930). "The conditions within the body may and do modify the effectiveness of its attack, but it is hard to believe that an active phage can be entirely without effect on the course of an infection by a sensitive organism" (Burnet, 1930). As bacteriophage appears to have no action on the living tissues there is no danger to be expected from introducing it into the body, but bacterial cultures are highly toxic immediately after lysis, though becoming less so on ageing. However, lysed bacterial suspensions have been shown to make effective protective vaccines, being independent of the phage they contain.

There is every reason to prosecute the enquiry into the possibilities of phage as a therapeutic agent in bacterial infections, but haphazard clinical trials will not advance our knowledge. The activity of the phage used must be controlled and the bacteriology of the cases must be followed carefully if results are to be obtained and if we are to increase our understanding of the problem. Therefore, it is my opinion that such work

4. BURNET, Med. Res. Council, "Syst. of Bact.", 1930, **7**: 463.
5. HANKIN, *Ann. Inst. Past.*, 1896, **10**: 175.
6. RIDING, *J. Hyg.*, 1930, **30**: 387.
7. TOPLEY, *et al.*, *J. Hyg.*, 1925, **24**: 17 & 295.
8. APPELMANS, *Comptes Rendus Soc. Biol.*, 1921, **85**: 722.
9. BRUYNOGHE AND MAISON, *Comptes Rendus Soc. Biol.*, 1922, **86**: 292.

can only be carried out effectively in collaboration with the laboratory. It must be remembered that the nature and mode of action of bacteriophage have not been determined yet, and that the investigation of its therapeutic activity and limitations has hardly begun.

E. G. D. MURRAY.

ROCKY MOUNTAIN FEVER

ROCKY Mountain Fever, "spotted fever", "tick fever", has been known for many years, but its scientific study dates from 1902, when Wilson and Chowning[1] noted its association with the bite of the wood tick. Shortly after (1903-1905) J. F. Anderson[2] again drew attention to it, and H. T. Ricketts[3] was the first to discover micro-organisms (now known as Rickettsia) (1906; 1909) in the blood of infected animals and was able to transmit the disease to guinea pigs by allowing wild ticks to feed on them. The disease is found chiefly in Montana but has been reported also from Nevada, Wyoming, California, Colorado, Washington and Idaho.

Tick fever has an incubation period of from three to twelve days, and is characterized by sudden onset, with rigor, general pains, and a quickly rising temperature. Nervous symptoms are pronounced. An eruption commencing at the wrists and extending to the trunk and legs appears on the third to the fifth day. The face usually escapes. At first the rash is discrete, taking the form of pink macules, but assumes a hæmorrhagic character, and may become confluent. The clinical course runs about three weeks. The resemblance to typhus fever is close, but there are some differences. Typhus runs an acuter, shorter course. The Weil-Felix reaction, present in typhus, is absent in tick fever. Typhus, again, has no relationship to ticks, nor is it probably the result of the bite of an insect. It is thought to be due to infection from the fæces of one or other of the numerous insect parasites. Again, as Kusama (reported by J. Segal[4]) has shown, the virus of typhus fever is closely bound with the blood platelets, while R. R. Spencer and R. R. Parker[5] found that a similar binding of the virus of tick fever does not take place, but that the virus is inseparable from the red and white blood corpuscles.

Some two hundred monographs on the subject of Rocky Mountain fever have appeared since 1902, but in spite of somewhat intensive research many problems still remain to be cleared up. A useful collection of studies by R. R. Spencer and R. R. Parker, of the United States Public Health Service, has recently been published[5] which embodies the facts obtained by them through experimental work subsequent to 1923. A few points only can be noted here out of many therein brought out.

Rocky Mountain fever is transmitted by a tick—*Dermacentor andersoni* Stiles—and is relatively common among those tending sheep. No case of naturally acquired Rocky Mountain fever has ever originated in a region where the wood tick was not prevalent. Yet, cases of infection have occurred among laboratory workers in whom there was no evidence or history of a bite by a tick. Since 1912 fourteen research workers have contracted the fever and nine of these had not been bitten. It seems probable that the virus may be conveyed from the tick in the course of manipulations to the skin, either abraded or normal, or to the conjunctiva or nasal mucous membrane.

The virus can also be found in another species of tick, infesting rabbits—*Hæmaphysalis leporis-palustris* Packard.

The ticks live about two years and are infective from the egg, through the nymph stage, to the adult. It is rather striking that unfed infected adult ticks will not produce active disease when their contents are inoculated into guinea pigs, yet will set up

1. WILSON AND CHOWNING, *J. Am. M. Ass.*, 1902, **39**: 131.
2. ANDERSON, Bull. No. 14, Hyg. Lab., U.S. Pub. Health & Mar. Hosp. Serv.
3. RICKETTS, *J. Am. M. Ass.*, 1906, **47**: 33; *ibid.*, 1909, **52**: 379.
4. SEGAL, *Brit. J. Exper. Path.*, 1922, **3**: 95.
5. SPENCER AND PARKER, Bull. No. 154, Hyg. Lab., U.S. Pub. Health Service, 1930.

immunity. After they are fed on animal blood the virus seems to become "reactivated", and infection will then be produced. Contrary to the opinion of Noguchi, Spencer and Parker do not find that the virus can pass through a filter (Berkefeld "N" and "V"), nor does the inoculation of the filtrate produce immunity.

Curiously, Spencer and Parker found that among known infected adult ticks the majority of those containing rickettsiæ were infective, yet some few were not. Also, some were infectious though rickettsiæ were not discovered in their tissues. Similarly, a small proportion of wild ticks from a supposedly uninfected region contained rickettsiæ, yet did not cause infection. These authorities suggest that here we have an avirulent form of the spotted fever virus, although the non-pathogenic nature of the rickettsia-bodies could not, of course, be ruled out.

They observed, also, that the red and white blood corpuscles of infected guinea pigs after repeated washings by slow centrifugation (1200 r. p. m.) are capable of transmitting the infection, although it was extremely rare to find organisms in fresh preparations or stained smears of such cells. This fact suggests that the virus of Rocky Mountain fever may at times assume a form incapable of demonstration by known methods. The life-history of the rickettsia still remains to be worked out.

Spencer and Parker were able to prepare a very efficacious vaccine from tick emulsions, diluted with saline solution so that each cubic centimetre contains the equivalent of one tick. Sterilization was effected by adding carbolic acid and formalin. It was found possible to immunize guinea pigs and monkeys with this vaccine. Protective bodies could be detected in the serum of inoculated animals. For human beings, as a prophylactic, the dosage employed was two injections of 2 cubic centimetres each at an interval of five days. The effect of the vaccine was striking. In the Bitterroot Valley in Montana, where the type of disease is most virulent, the mortality from Rocky Mountain fever from 1925 to 1928, inclusive, was 90.91 per cent among the unvaccinated; among the vaccinated it was only 9.09 per cent. In Idaho, where the type of disease is the mildest, 1 case occurred among 193 vaccinated men and 22 among 364 unvaccinated. These results seem to show that the vaccine is capable of giving partial protection, sufficient to ensure relatively mild infections and recovery, in most cases of the virulent type, while full protection is usually given against the mild type of the infection. These results seem to be very satisfactory. We may hope that the doubtful points in regard to the pathogenesis of this remarkable disease will eventually be made clear. A.G.N.

MEDICINE AND THE PEOPLE

IN the systematic application of medical science to the needs of the sick there are two elements which may be compared to the power and transmission in an automobile. The most efficient engine will not get us very far if transmission of its power be poor, and even perfect transmission will leave us stranded if the engine is inadequate or unreliable.

In the medical system it is the transmission that seems mostly at fault. We speak proudly, and are right in so speaking, of the remarkable sciences of Medicine and Surgery, and the many sciences that build up for them their broad and solid foundations; of the phenomenal advances of all these sciences in recent years; of the fine spirit and worthy history of our calling; of its general intelligence, clear-headed humanity and wide charity. But all this tremendous engine force, all this up-to-dateness, this "super-everything", all this power for good is transmitted to the needs of the people by systems of practice which have had few improvements, except the telephone and automobile, and, perhaps, group-practice, since the day of the Roman chariot. The very last word in engines is installed in a Red River cart. These modern sciences and high arts that prevent diseases, restore health, and prolong life have still to be peddled as at a country fair to people who appreciate little of what is offered, and even

less their own need of what these sciences and arts could bring.

Still another figure may perhaps suit the case even better. Here is a gorge with bridges. On one side are all sorts and conditions of illness needing prevention and cure, and ill people and threatened people needing help, though far from fully aware of the help they need, or when they need it, or why. Over on the other side of the gorge are all the various phases of modern scientific medicine, skill, research, hospitals, special knowledge, disease prevention. But between these two sides, as in the parable, there is a great gulf fixed.

Across this gulf are three bridges. The first, with one pier named for Hippocrates and another for Sydenham, and with the glamour of centuries about it, is the ancient toll-bridge of *Private Practice*. It is not broad. It does not give easy or adequate access from the side of Help to the side of Need. Still there is much that can be said for this fine old bridge when ideal and adequate relations have been well established between individual need on one side and an individual helper on the other. But when the whole great mass of need is considered, all sorts and conditions of people, the need of education, of prevention, and of regulation as well as cure, the bridge of Private Practice, with all its fine associations, seems in these days scarcely equal to the traffic that should pass from side to side.

The second old bridge, with a pier that bears the name of the Good Samaritan, is the bridge of *Charity*. Men of our calling are proud to think how during all the ages of the world's history Need has called despairingly to Help, and Help has come most willingly to Need across this fine old bridge. Long may it stand. Yet it can never carry the whole traffic, and undoubtedly carries now, and has always carried, much that might well use other bridges.

The third bridge is not old, but glaringly new, though built on many old foundations, like the priestly system of health regulation and the treatment of disease among the Hebrews. It is the bridge of Public Health Services. So far it is narrow and has more to do with prevention than with cure. This bridge simply had to be built, for one reason because the others could not cope with epidemic disease, and for another reason because the Bridge of Charity was so much over-used. This new bridge connects between the same body of science and art and the same mass of human need as the other bridges. Narrow though it still is, and new, builders are constantly at work upon it, and it has trebled its capacity within our own memories. Yet withal it has not room for many services that could well make use of it.

Now what is the future to bring? Will the gulf always be bridged by just these three bridges? If so, there must still be widening of some or all of them and surely a better division of function than at present. Or is the newer bridge of Public Health Service to keep widening until it becomes practically the only one? Who can say? Who could be wise enough to dare to choose, even it he had the choice? Much would be lost if the fine old bridge of Private Practice were to fall into utter disuse, and the traditions and spirit of our calling would be much the poorer if the bridge of Charity were to be closed and finally sink into the gulf. Who can say what developments may be, even in our own day, and who can even guess at what is beyond?

These are among the very big questions before our profession, and yet by no means confined to our profession. We are apt to forget that these are not our problems only but problems of the people at large, in all community and state groups. To keep the standards of our science and art, and the spirit of our services high—that is our special and particular duty. But to devise and shape plans by which our science and art can best be made available for the needs of the people—that is a general duty for the councils of the state. In this duty we should share, perhaps share largely, that is, if we are planning for the general good and not for ourselves alone. For the final plan, however long delayed, will inevitably be the plan that will transmit most and best for the needs of the people the science and art that make

for the prevention and cure of disease and the maintenance of health. An old idealist of our calling, Saint Benedict, points the way. "The care of the sick is to be placed above and before every other duty."

D. A. STEWART.

Editorial Comments

The Value of Liver Extracts

We publish in this issue a paper by Dr. E. S. Mills, in which he discusses the value of various liver extracts in the treatment of pernicious anæmia. The efficacy of liver substance in controlling pernicious anæmia is now well established, but it is evident that not all forms of liver are equally effective. The first and most encouraging results of treatment were obtained from liver substance itself, either raw or very slightly cooked. Then the various extracts of liver were developed, with a view to concentration and conveniency.

What Dr. Mills insists on, is that the extracts which he has used are not as effective as the raw liver itself. This is a conclusion which can only be arrived at by the detailed study and comparison of large numbers of cases. Dr. Mills has made his observations amongst the abundant clinical material at the Montreal General Hospital and his results are therefore to be reckoned with. Nor is he alone in his conclusions. The point was also dealt with at a recent meeting of the Royal Society of Medicine (*Brit. M. J.*, April 4, 1931, p. 584), and the statement was made that "liver extracts were more expensive and not so reliable."

It seems to us most important that this should be generally known. If liver extracts are to be used at all they should be those prepared by rigidly scientific methods. Even these, however, do not seem to be more than second best to the liver pulp.

H.E.M.

More Concerning BCG

Experimental work with BCG may be divided now into two main groups: (1) immunity experiments; and (2) observations on the pathogenicity of the organism or on its ability to revert to a pathogenic strain.

The work of A. Stanley Griffith, in collaboration with Professor Buxton, of the Department of Animal Pathology, Cambridge University, has so far chiefly been reported at meetings and in the lay press. These workers stress the point that their particular strain of BCG seems completely avirulent for laboratory animals and cattle. Their work shows that calves vaccinated intravenously with BCG, and then re-infected by the same route with doses of virulent bovine tubercle bacilli sufficient to kill controls in a matter of weeks, exhibit a marked resistance to the infection. True it is that some of them after a year may develop meningeal symptoms severe enough to justify slaughtering, but the intravenous method of infection is a noticeably severe one. On the other hand, Griffith has had much less convincing results, in protecting monkeys with BCG, whether the virulent infection was an experimental ocular one or a natural contact-infection. These results are in great contrast to the oft-quoted ones of Wilbert.

The latest work on pathogenicity by Dreyer and Vollum,[1] of Oxford, is suggestive. Two strains of BCG were used, one from the Medical Research Council which had been received from Calmette several years ago, and a recent one obtained directly from Calmette. By growing the first strain in deep veal peptone bouillon they obtained cultures which were universally pathogenic for guinea pigs and rabbits in large doses, whereas from the other strain only a few of the inoculated guinea pigs developed progressive tuberculosis. The cultures were submitted to A. Stanley Griffith who reported that, culturally, they resembled bovine bacilli which had been modified by growth on glycerine media, whereas the animal experiments indicated that although they were pathogenic for guinea pigs their virulence for the rabbit was relatively low, not in fact exceeding that sometimes encountered with standard human strains. From the above experiments it would seem that undoubtedly BCG has some immunizing properties and that some strains appear to retain their avirulent properties. On the other hand Dreyer's findings are another addition to those reported by other observers on the restoration of virulence of some strains of this organism.

It may be that in certain localities where the exigencies of the conditions demand it, and where the strain of BCG used has been well studied, and is continually being studied, the use of this organism, failing some other method, is justifiable for vaccinating cattle. But we cannot subscribe at this juncture to any other than the conservative attitude adopted so far in Canada, England, Germany and Austria against the use of this organism in human infants. In fact, every such report as Dreyer's should defer the day still further when such methods can be considered, and until the whole question of the restoration of virulence of the

1. Dreyer and Vollum, *The Lancet*, 1931, **1**: 9.

organism has been thoroughly thrashed out, for it clearly appears that certain strains are not completely avirulent. ARNOLD BRANCH

Hedyotis Auricularia in Amœbiasis, Cholera, and Colitis

Some time ago[1] we noticed editorially the use of *Hedyotis auricularia* in the treatment of various forms of diarrhœa, a remedy which was brought to our attention by Capt. P. R. Bhandarkar, L.M. and S., of Madras. Since that time Capt. Bhandarkar has continued his observations and now sends us a pamphlet entitled "Hedyotis Auricularia in Colitis, with Special Reference to Human Amœbiasis and Cholera."[2]

Hedyotis auricularia is a plant belonging to the natural order of Rubiaceæ, which is indigenous to the "wet-lands" of India, and to the Malay Peninsula and Archipelago, Malacca, south China, the Philippines, and Australia. The inhabitants of Sikkim eat its leaves, finely cut and boiled with rice, and in South Kanara it is used as a household remedy for diarrhœa and dysentery, in the form of a bolus of the fresh green leaves or as a decoction of the whole plant. It is also used prophylactically as a soup during the monsoon months. The plant is not officinal and is not referred to in medical literature. B. B. Dey, M.A., D.Sc., F.I.C., Professor of Chemistry at the Presidency College, Madras, has succeeded in isolating from it an alkaloid and its hydrochloride in pure state, together with a possible glucoside.

Capt. Bhandarkar gives details in his pamphlet of twelve cases of dysentery or colitis treated with the remedy, either in the form of a fresh bolus or as a standardized liquid extract. All the patients recovered except one who died suddenly from cardiac failure during convalescence, probably owing to scurvy as a complication. As Capt. Khandarkar admits, not all the cases will stand scientific scrutiny, but three out of the twelve were definitely diagnosed as amœbiasis by finding active *Entamœba histolytica* in the stools, and after treatment the amœbæ had disappeared or were dead and disintegrating. Two of these cases were acute and one was chronic. Under the drug relief was afforded often in twenty-four hours and cure was effected in from five to fourteen days. Many of the patients had been treated previously by emetin, opium, or astringents in the ordinary way without a cure being obtained, or even amelioration, yet the disease yielded to Hedyotis. It was probably not a case of *post hoc propter hoc*. The cases recorded were from the practices of a number of physicians acting independently.

The striking results obtained by Capt. Bhandarkar with Hedyotis in cases of acute and chronic colitis induced him to try it in infective diarrhœa, and later in true cholera asiatica. Of 114 cases diagnosed clinically as cholera, 79 treated by the ordinary accepted methods had a mortality of 44.3 per cent; 30 treated with "Hedaurin" (extract of Hedyotis auricularia) had a mortality of 13.3 per cent. Numerous other cases, in which the cholera vibrio was isolated, were treated with success, there being a mortality of only 12.9 per cent. In Madras, from July 28, 1929, to January 4, 1930, there were 19,127 cases of cholera, treated by the old methods, with a mortality of 50.54 per cent. Capt. Bhandarkar thinks that, while the number of cases of cholera treated with the new remedy is not large, the excellent results obtained are "strongly indicative of its probable specificity in cholera." He appeals to the medical profession to investigate further the therapeutics of *Hedyotis auricularia*. He seems, at least, to have made out a *prima facie* case for his contention. A.G.N.

The International Health Year Book

For the fifth consecutive year the Health Organization of the League of Nations presents in this comprehensive International Health Year Book a series of reports (including vital and public health statistics) on the public health progress in forty countries, colonies and dependencies.

The material relates to the year 1928 and, as in the case of the preceding four volumes, twenty-seven standard tables, arranged according to seven groups, are included. These deal with general demography; birth rate; causes of death; infant mortality; public health statistical data; curative medicine. In addition, the present volume contains a review of the public health work of the Rockefeller Foundation and of the League of Red Cross Societies for that year.

The great mass of useful and valuable public health information included in this year book has been assembled and prepared by officers of the public health administrations of the various countries, the data of which are presented. Much that is of great interest and significance to public health workers, physicians, and the general public in all parts of the world is embodied in this compilation. Including the index, no less than fifteen hundred pages are required for the essential information relating to this very large group of political units.

The section of the report dealing with the Dominion of Canada is presented in about fifteen pages. The topics dealt with are: health organization, including sanitary protection of the frontiers of the Dominion; overseas immi-

1. *Canad. M. Ass. J.*, 1929, **21**: 591, 721.
2. Pharmacological Research Institute, Madras, 1930.

gration medical service; international health service; the fumigation of ships; the campaign against acute and chronic diseases; public health activities in the field of child welfare; school hygiene; industrial hygiene; supervision of foods and drugs; narcotics; patent medicines; water supply; the work of the Laboratory of Hygiene in the Dominion; and curative medicine. A statement of the number of hospitals and the total number of hospital beds in all nine provinces is set out. The estimated average maintenance cost per patient day in hospitals throughout Canada, as well as a statement of the replacement valuation of all hospitals in Canada, has been estimated and is set down as $241,202,000. The sum of $51,406,000, it has been estimated, is the annual budget of all hospitals in Canada. Brief reference is made to the Marine Hospital Service of the Department of Pensions and National Health; a list of hospital associations is given; the total number of physicians in practice in Canada is stated to be 9,000; and finally the budget for the health division of the Department of Pensions and National Health is presented.

A number of countries other than member-states of the League of Nations have submitted statements which are published in this volume. Among these are the Union of Soviet Socialist Republics and the Republic of Turkey. The United States of America and the Philippines, also non-member states, have submitted interesting compilations and reviews.

To be informed regarding health conditions in the fields both of preventive and curative medicine in other countries than our own is an imperative duty, if for no other reason than for that of self-protection. It is particularly important for members of the medical profession to be aware of the advances in the field of public health and in the practice of preventive medicine. Then, too, the increasing tendency, manifested especially in recent years, toward socialization of medical service indicates the wisdom of being cognizant of these tendencies and developments. No other profession has the same intimate relationship to public welfare and social progress as has medicine. In these circumstances it is inevitable that the relationship of the medical practitioner to the community may, from time to time, be considerably changed. The present volume of the International Year Book serves the purpose of providing material for members of the medical profession in this and other countries, to keep abreast of developments which they, of all people in the community, should have knowledge.

J.G.F.

Delegates to the Vienna Hospital Congress

Information has been received that the British Hospitals Association proposes to have a luncheon in London to which will be invited those delegates from Canada *en route* to the Second International Hospital Congress to be held in Vienna in June. Hospital delegates from Canada and the United States are being entertained in London, Copenhagen, Berlin, Prague and other cities, and this luncheon is to be part of the effort of the British Hospitals Association to show hospitality to delegates from this continent during their sojourn in London. The luncheon will be held on Tuesday, May 26th, in the Great Hall at St. Bartholomew's Hospital. There is a possibility that a member of the Royal Family may be in the Chair. Any hospital superintendents or members of the medical staff proposing to attend this Congress and to be in London on this date can obtain further information from the hospital or from Mr. R. H. P. Orde, Director of the Central Bureau of Hospital Information, 12 Grosvenor Crescent, London, S.W.1. Also, any medical men proposing to be in Vienna during the second week of June are asked to get in touch with Dr. Harvey Agnew in Toronto. G.H.A.

The Royal College of Physicians and Surgeons of Canada

The Royal College of Physicians and Surgeons of Canada desires to announce that the first examinations will be held about the last week of September or the first week of October in Edmonton and Montreal.

The regulations relating to the examinations will be found in this issue under "General News", and copies of these may be obtained from the Registrar-Secretary, Royal College of Physicians and Surgeons of Canada, 184 College St., Toronto.

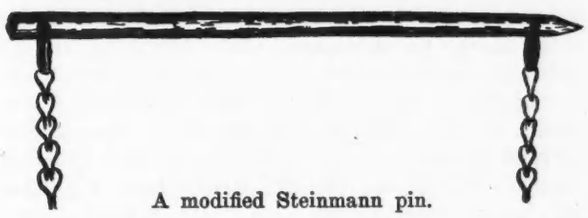
Further detailed announcements of the examinations will appear in subsequent issues of this *Journal*.

Clinical and Laboratory Notes

A SIMPLE MODIFICATION OF THE STEINMANN PIN

BY JOHN H. DUNCAN, M.A., M.B.,
Sault Ste. Marie, Ont.

A simple modification of Steinmann's pin can readily be made by a blacksmith from a steel rod drawn out to about one-quarter of an inch in diameter and slightly thicker at one end than the other. The length should be from five to seven inches, the cross section roughly hexagonal, and the small end should be sharpened. About one-half an inch from each end a hole should be drilled large enough to



A modified Steinmann pin.

take a small key ring. With due regard for asepsis, the pin is driven through the bone with a hammer, the soft tissues being incised more on the distal than on the proximal side of the bone wound to avoid pain from tension later on. The key rings slipped through the holes in the pin connect it with a light chain such as is used for furnace dampers. Any desired amount of extension can now be obtained preferably in association with a Thomas splint. This arrangement is so simple and has proved so satisfactory that it may have been described before, but not to my knowledge. It has the merits of being inexpensive, readily available, indestructible and very easily removed. (See Fig.)

THE COPPER CONTENT OF PLANT AND ANIMAL FOODS

The amount of copper in about 160 samples of common foods, both animal and vegetable, was determined. No food examined was absolutely without copper. Certain cereals, such as polished rice and patent wheat flour, were very low in copper, compared with the whole grain. The figures found in the various articles of food examined range from 0.1 mg. per kilo. for fresh celery, to 44.1 mg. per kilo. for fresh calf's liver. The classes of food in the descending order of their content in copper are: nuts, dried vegetables, cereals, dried fruits, poultry, fish, animal tissues, green vegetables, roots, leafy vegetables, fresh fruits and non-leafy vegetables. A wide variation was found in the copper content of livers of various animals; calf liver was highest and hog liver lowest. The copper content of oysters was strikingly high and surpassed that of all other marine foods. The variation in the amount of copper in foods of the same class was less than that of the variation of either manganese or iron. — C. W. Lindow, C. A. Elvehjem, and H. W. Peterson, *J. Biol. Chem.* 1929, **82**: 465.

A NEW COLORIMETRIC TEST FOR THE ESTIMATION OF ADRENALIN

The following method was found satisfactory. To 1 c.c. of liquor adrenalin hydrochloride add 2 c.c. of aqueous ammonium molybdate and make up with distilled water to 50 c.c. in a Nessler glass. A blue colour develops instantly, and is permanent for several hours. This is matched colorimetrically by either a standard solution of adrenalin of known strength or tannic acid. To ascertain the amount of tannic acid required to match 1 c.c. of liquor adrenalin the following test was carried out. A 1 per cent aqueous solution of tannic acid, previously dried to constant weight in a desiccator, was prepared. One c.c. of this solution was treated with 2 c.c. of the reagent, and diluted with distilled water to 50 c.c.; 5 c.c. of the coloured solution thus obtained when diluted with distilled water to 50 c.c. was found to match exactly the colour given by 1 c.c. of liquor adrenalin B.P. Therefore, the standard so prepared is equivalent to 1 mg. of adrenalin. The following substances which are likely to be prescribed with liquor adrenalin were tested by adding 1 c.c. to 1 c.c. of liquor adrenalin before adding the reagent, and comparing the colour given with 1 c.c. of liquor adrenalin without any addition: 1 per cent solution of cocaine HCl, kerocain, stovaine, benzamine lactate, borax, and sodium chloride; saturated solution of boric acid, chlorbutol; aq. chloroform, aq. rosæ, and aq. sambuci. None of these substances interfered with the test; the first two gave a slight precipitate on adding the reagent, but this readily dissolved on the addition of the distilled water. It is essential that all reducing substances such as ferrous salts, alcohol, bisulphites, etc., should be absent, as these give a blue colour with the reagent. Urine was also found to give a colour, and the test could therefore not be used for the determination of adrenalin in urine. Some liquor adrenalin was prepared with synthetic adrenalin, and this was found to give exactly the same depth of colour as that given by the natural product.—J. Rae, *Pharm. J.*, 1931, **3499**: 451.

Special Articles

CERTAIN CONTACTS OF MEDICINE AND THE LAW*

BY CHIEF JUSTICE MORRISON,

Vancouver

At the outset Chief Justice Morrison pointed out that the functions of the Court and of a medical man are quite distinct. The function of the doctor in ordinary life is treatment; the function of the Court is to determine liability. When the doctor comes before the Court, however, his function is to assist the Court, to which he is responsible, in arriving at the truth. It is obviously absurd for an uninstructed judge or jury to decide on medical questions. It should be remembered, however, that the medical problem in a trial is only one of many and all the facts, medical and otherwise, must be taken into account before a decision can be given. Cases coming before the Court, in which the aid of the doctor is necessary in order to enable the matter in dispute to be properly determined, are innumerable and increasing, as witness the growing number of automobile accidents, insurance cases, cases of assisted abortion, and so on.

Doctors come to the aid of the Court in one of two capacities, either as assessors or as witnesses. The rules of the Court provide for the calling to the aid of the judge and jury one or more doctors as medical assessors. Whilst acting as assessors medical men do not decide on the facts, they merely give their opinion as assistants. Their advice may be, and is, disregarded, but not often. *They* do not decide; that is the responsibility of the judge or the jury as the case may be.

Medical men assist the Court best as witnesses in the witness box. As witnesses they appear either as witnesses of fact or as experts. As experts, they give their opinion to explain the bearing which the facts may have on a particular point. When called as experts they do not, of course, pretend to depose as to the facts, but, owing to their special knowledge, they are called to aid the Court in appreciating the value or meaning of a fact not observed by them and they are permitted then to express their opinion, which a witness to the fact may not do.

The medical witness must not be a partisan. He does not come to give evidence pro or con, but to aid the Court. An expert witness is called in to assist by virtue of his special knowledge. The significance of an observed fact is often only of value when judged by an expert.

The medical man who is called as a witness of the fact is often placed in a most trying and invidious position. It is, of course, needless to say he must not lend himself to the concealment of a crime nor to its commission. Secondly, there is a rule that *a doctor cannot refuse to answer questions put to him, even though it affects his medical confidence.* The duty of a doctor to preserve his patient's confidence is one not lightly to be set aside, but a doctor, as a witness, is there to assist the Court; he is not there to advance the interests of his patient exclusively. He is subject to cross-examination upon all matters relevant to the issues in the case. He is subject to the rulings of the Court, for it is in the public interest that he should be. In all cases where a person is charged with infanticide, assisted abortion, murder, manslaughter, concealment of birth, etc., the doctor who may have attended the patient may be called by the Crown to give evidence against his patient at the trial of the charge that is laid. In divorce trials the doctor in attendance is often called by the other side. As his position is most confidential, a delicate situation is created, and one which might, in the hands of an unscrupulous patient, be used to the detriment of the doctor by imputing a betrayal of that confidence.

A medical man, when called as an expert witness, *if he is not sure of a fact should say so.* The Court respects such a man. One thing is certain; it is a great mistake to be "cocksure" and pretend to know too much.

The medical man is not *an advocate.* Generally speaking the Bench and the Bar trust a medical witness; hence the doctor may face his duty with equanimity. No class of evidence is viewed more sympathetically than medical evidence, and the medical man may rely upon this feeling on the part of both judge and jury.

Then we come to the great and important field of *insanity.* The question of insanity is approached by the medical and legal professions from different points of view. The misunderstanding between the law and medicine as to the bearing of the criminal law towards insanity is to be deplored. The attitude of the criminal law towards insanity is the question, not the insanity *per se.* To begin with, the law does not define insanity. The two professions regard it from different

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* Abstract of an address delivered by the Hon. Chief Justice Morrison before the Vancouver Medical Association on January 6, 1931. From the *Bull. Vancouver Med. Ass.*, 1931, 7: 139.

viewpoints to some extent. The lawyer bases his view upon the clear, simple, principle of the law that everyone is presumed to be sane and to possess a sufficient degree of reason to make him responsible for his acts, until the contrary is proved to the satisfaction of the jury which is trying the case. The prosecution is not called upon to prove the sanity of the person accused, for his sanity is presumed. The onus of proving insanity, which is a matter of defense, is *upon the accused.* He must prove that at the material time he was afflicted with a disease of the mind to such an extent that it brought about such a defect of reason that he did not know the nature and quality of the act he was doing, or if he did know what he was doing that he did not know he was doing what was wrong.

The material time is the time of the perpetration of the act, and this must be proved with particularity. The defence must prove *first* and foremost that the accused was suffering from a disease of the mind; *secondly,* that in consequence of that disease he was labouring under a defect of reason; *thirdly,* that that defect of reason so brought about was of one of two particular kinds. That defect of reason, when so found, must be clearly proved to be such as either (a) to prevent him from knowing what he was doing; or (b) to prevent him from knowing that he was doing what was wrong. The defence must prove that either one of these conditions existed at the material time.

The third prerequisite illustrates the difference between the point of view of the lawyer and of the doctor as to the criminal law. The doctor who ordinarily examines a patient with a view of determining as to his insanity may well come to the conclusion that his mind is diseased and that therefore he labours under a defect of reason. Having arrived so far, he then decides upon the degree of medical attention and care to which his patient is to be subjected. His responsibility is to his patient. But where the patient is charged with having committed a crime the public are interested and the question arises whether he is to be excused from responsibility for what appears to be his criminal act, in which case the criminal law insists upon further inquiry, *because disease of the mind alone, although a justification for treatment by the doctor, affords no defence.* He must prove that that disease of the mind at the material time prevented him from knowing what he was doing when he committed the act, or prevented him from knowing that he was doing what was wrong. Of course it is consonant with the principles of the law and with common sense that he should be excused from criminal responsibility if he was at the time in such a state of unreason through a disease of the mind as not to know what he was doing. In this condition he cannot have known the nature and quality of his act. That means, as an eminent judge has put it, that he thought he was peeling an apple when in fact he was cutting a throat. In that case he did not know what he was doing. And it may also be said that though from a disease of the mind he is in such a state of unreason he knows what he is doing but he does not know that he is doing what is wrong. To illustrate this condition the learned judge gives the case of the woman who strangled her mother-in-law, laid the dead body on the hearth rug and called in her neighbours to see how well she had done her work—saying, "It was my duty to do it, and you see I have done my duty." In that case she knew what she was doing but did not know that what she was doing was wrong.

The question of the conditions which have to be proved in order that a person may be excused from criminal responsibility is a legal question, and for the courts, to be determined in accordance with the principle of the criminal law. It is submitted by some high medical authority that a person charged with a criminal offence should not be held responsible when he committed the act charged under an impulse which by mental disease he was powerless to resist. That of course raises a fundamental difference as regards the third condition, rendering it immaterial that the prisoner knew what he was about or that he knew he was doing what was wrong. He might claim immunity notwithstanding he knew what he was doing because he was acting under an impulse caused by a diseased mind which deprived him of the power to resist or desist. The Lord Chief Justice of England, in a treatise on this subject dealing with the Report of a Special Committee and the expressed views of the British Medical Association thereupon, as set out briefly in the foregoing remarks, says that the suggestion is the ancient and dangerous plea of the uncontrollable impulse, which in practice is so difficult to distinguish from the impulse that is not in fact controlled. The doctrine involves two propositions which are not of the same kind nor upon the same plane. The first proposition is one of fact, namely, that there are, as a matter of scientific imagination, not of controversial speculation but of actual experience, unfortunate persons in existence who though they know what they are about and also know that they are doing wrong, are nevertheless impelled by disease and irresistible impulse to commit an apparently criminal act. The second proposition is of legislative morality or expediency, namely that these persons by reason of their number or otherwise are of such importance as to require or deserve a fundamental revision of the criminal law.

Should such an alteration take place, which is not at all likely, it would do away with the necessity for objection tests now applied by judge and jury. It would do away with the necessity of considering the evidence to ascertain whether the prisoner was aware of what he was doing or that what he was doing was wrong. The test that would be left would be whether he was guided by an irresistible impulse. It can readily be seen what is the predicament of the jury called upon to try a man under these conditions—conditions which would leave them with little, if any, guidance. They would have to rely solely upon conflicting medical testimony. As to the prisoner's responsibility to the law, why have a jury—why not also leave that question shorn of its objective tests to the doctors?

This doctrine of uncontrolled or uncontrollable impulse has been repeatedly rejected in this country. As one eminent judge has said, "If an influence be so powerful as to be termed irresistible, so much the more reason is there why we should not withdraw any of the safeguards tending to counteract it. There are three powerful restraints existing, all tending to the assistance of the person who is suffering under such an influence; the restraint of religion, of conscience and of law. But if the influence itself is to be held a legal excuse rendering crime dispunishable, you at once withdraw a most powerful restraint, that of forbidding and punishing its perpetration." This doctrine of uncontrollable impulse has been considered, is so considered to-day, a most dangerous one, fatal to the interests of society and the security of life.

Persons tried on any charge in any of our Courts have so many safeguards thrown around him, that the chance of any miscarriage of justice is so remote as to be entirely negligible.

The learned Chief Justice concluded his remarks by adding that if the law were relaxed it might well be that in cases where there has been no such evidence of mental disease antecedent to the alleged crime mental experts would be found to say that the alleged crime itself afforded evidence that it was committed under an uncontrollable impulse and that upon that ground the inference might be based that there was no mental disease. If so the result might be to transfer to a section of the medical profession the question whether a great number of ordinary criminals should be held responsible to the law.

Men and Books

EARLY OPHTHALMOLOGY IN TORONTO*

BY P. J. F. HOUSTON, M.D.,

Oculist, Toronto East General Hospital

Toronto

The early history of ophthalmology in Toronto is, to a great extent, the early history of the specialty in Upper Canada. It is true some work was being done in other centres; by Dr. F. B. Spillsbury in Kingston, and Dr. John Stratford in Brockville. In Toronto, however, there has been a steady development in ophthalmology since the year 1840. As in any department of medicine, so in ophthalmology, the records of development are the biographies of the pioneers in that development.

Previous to 1840 treatment of diseases of the eye was, for the most part, in the hands of the military surgeons attached to the regiments stationed in Toronto. In that year William Rawlings Beaumont came to Canada and soon obtained a licence to practise from the Upper Canada Medical Board. So far as early records can be found, he was the first man to do eye surgery in Toronto. Dr. Beaumont was born in London, England, in 1803. He received a liberal education; and, at an early age, studied under Abernethy and Sir Astley Cooper at St. Bartholomew's Hospital. He obtained the licence to practise surgery and became a Fellow of the Royal College of Surgeons. Soon after his arrival in Toronto, he was appointed to the Professorship of Surgery in the University of King's College, the medical department having just been organized as the first medical school in Upper Canada. He was a skilful surgeon and sound lecturer. In 1870-71 he delivered a course of lectures in ophthalmic surgery to the students of the Toronto School of Medicine.

He invented several useful surgical instruments and made them himself, among them being a sliding iris forceps. In 1836 he invented and described before the Royal Medico-Chirurgical Society an instrument for passing sutures in deep-seated parts. This instrument is reputed to have given the idea for the present sewing machine. He was the author of numerous essays on medical subjects, one of these being "A penetrating wound through the orbit five and one-half inches deep with recovery." In the winter of 1865 he lost all useful sight of the left eye from acute inflammation, in all probability glaucoma, but was still able to perform operations requiring an unerring hand

* Read before the Section of Ophthalmology, Academy of Medicine, Toronto, Nov. 3, 1930.

such as optical iridectomy. The sight of the right eye became impaired also and he spent the last two years of his life in blindness.

Previous to the time that Beaumont had settled in Toronto, the Stratford family had arrived from England at Brockville, where the father, Dr. John Stratford, practised for a time.

The eldest son, Samuel John Stratford, had received his medical education at St. George's and Westminster Hospitals, London and was a pupil of the famous Dr. Guthrie at his Eye Infirmary. After coming to Canada he practised for a time in Bytown (Ottawa) and then in Woodstock. He came to Toronto about the year 1850 and announced himself as surgeon, accoucheur, and oculist. He practised in Toronto for ten years and during that time he established the first Eye and Ear Infirmary, which records show was at the corner of King and Church Streets. The hours for treating the poor were 10 to 12 a.m. daily, except Sunday. He lectured on anatomy at Rolph's School for a time and also was Professor at Trinity Medical School. He was the editor of the *Upper Canada Journal of Medical, Surgical and Physical Sciences.* Funds not being available for carrying on the work of his Infirmary Dr. Stratford returned to Woodstock, and practised there until 1869, when he went to New Zealand. Another brother settled in Brantford. He also had studied medicine but engaged in the drug business. He was the founder of the Brantford General Hospital.

Of the work done by Stratford while here we have no records. He had been trained in ophthalmology in England; but so little progress had been made in the specialty at that time that he had limited opportunities. He would have had no ophthalmoscope, as the first ophthalmoscope in America was brought to the United States in 1853. It is also doubtful if he did any refraction. In surgery of the eye he would require to enucleate injured eyes which nature failed to repair, and to perform cataract operations, as Norman Bethune and Beaumont were doing at the time. In the treatment of glaucoma he was also limited, as Von Graefe did his first iridectomy in 1856. With the departure of Dr. Stratford, Toronto was left without any provision for the care of eye patients. The old Toronto Hospital at the corner of King and John Streets was limited in accommodation and made no provision for such cases. It was at this time that Dr. Rosebrugh came to Toronto.

Abner M. Rosebrugh may rightly be called the father of ophthalmoiogy in Toronto. He was the first doctor to limit his practice to eye and ear cases. He was born at Branchton, near Galt, in 1835; educated at the Grammar School and at Victoria College, Cobourg. He studied medicine at Rolph's School and began practice at Preston.

Realizing the need of an eye and ear specialist; and, there being no one at the time with whom he might practise and learn the specialty, he began the study of the eye in dogs and rabbits. His success in practice brought many patients to his country office in Preston, and he realized how poorly he was equipped for his new work. He went to New York and London for post-graduate study, and, on his return in 1863, opened an office in Toronto. Wishing to begin his special practice with the endorsation of the medical fraternity, he called on many of the doctors, announcing his intention. While some of the older members of the profession were really glad to get rid of a part of their practice of which they knew little, others were not so kindly disposed. As his office room in his house at the south-east corner of Queen and Church Streets was limited, he could not accommodate the poor who came, especially on market days, and filled his house as well as his office. To a man of his generous disposition this was a source of considerable worry. He began to devise means to remedy the condition. He interested a few business men and, through their generosity, an Eye and Ear Infirmary was opened on Adelaide Street West. Here he gave years of service to the poor of Toronto and surrounding country.

Dr. Rosebrugh added much to the resources of the ophthalmic surgeon by his inventive genius. In 1865 he invented an ophthalmoscope with which he could photograph the fundus of the living eye. The instrument was made for him by Charles Potter, 20 King Street East, and cost ten dollars. The advantages claimed for this instrument were: The simplicity of its construction, considering its two-fold purpose, as an ophthalmoscope and a photographic instrument; the limited experience necessary to use it successfully, compared with months in learning to use the ordinary ophthalmoscope; with it artists would be enabled to make coloured diagrams of the internal eye which, with the instruments then in use, had never been done.*

He was also interested in inventions outside of ophthalmology, and improvements made by him were adopted by the Bell Telephone Company. As a teacher of ophthalmology his ability was widely recognized. As early as 1866 he delivered a course of lectures on diseases of the eye to the ophthalmic class of the Toronto School of Medicine and the students of the medical department of Victoria University. These lectures were published in

* Dr. Henry Noyes photographed the fundus of the living eye in Bellevue, New York, in the early sixties but probably after this time.

the *Canada Medical Journal* of Montreal for the benefit of doctors throughout Canada interested in eye work. Considering the progress made in ophthalmology at that date, these lectures give a good idea of the ability of Dr. Rosebrugh and of his attempt to keep abreast of the times, separated as he was from larger centres where research work was being done.

His first lecture was on "Optical defects of the eye and their treatment by the scientific use of glasses". The first part of the lecture deals with optical considerations, light, and the properties of lenses. He describes at length hypermetropia, myopia and presbyopia and their treatment by spherical lenses. The lecture ends with this significant statement: "There is an optical defect of the eye that is occasionally met with called astigmatism in which the horizontal and vertical lines are not brought to a focus at the same distance behind the lens. I have seen but one case." The next lecture was on "convergent strabismus." The treatment advised was the use of proper convex lenses. He gave a clear explanation of the reason for their use. This not curing the case, he advised section of the internal recti, explaining that this must be a tenotomy not a myotomy. In connection with this lecture we must remember that that Donders' "Anomalies of refraction and accommodation" was published in English only a year before these lectures were given. He ends the lecture by saying "The great point to be kept in view is the restoration of binocular vision. The eyes may appear to be straight and friends may be satisfied; but, unless binocular vision is restored, the surgeon cannot congratulate himself on the result." A succeeding lecture was on glaucoma, which is described much as we would do to-day, but the only treatment he advised was iridectomy. No mention is made of miotics, and, of course, filtering scars are of much later date.

Besides being a clever oculist and skilful surgeon, Dr. Rosebrugh was a philanthropist. He was the friend of the poor, as we have already pointed out. He was interested in prison reform, and prisoners owe much to his unfailing efforts to improve their treatment. He also gave much time to the study of the treatment of inebriates. During his later years he became quite deaf and this forced him to retire from practice.

Dr. Rosebrugh was joined in practice in 1867 by his brother-in-law, Richard Andrew Reeve, who became later Toronto's best known oculist. Dr. Reeve early received the appointment of lecturer in ophthalmology in the medical faculty of Toronto University and later became the Dean of the Faculty. He was also the first oculist to receive an appointment in the Eye and Ear Department of the old General Hospital endowed by the late Andrew Mercer. Colonel George Sterling Ryerson was another of the early oculists. He was born in Toronto in 1854; was the oculist and aurist to Toronto General Hospital, and Professor of Ophthalmology and Otology in Trinity Medical School. These were followed by Adolph Alt, who went to St. Louis and became a well known American ophthalmologist, G. H. Burnham, Charles Trow, Murray McFarlane, L. L. Palmer, J. T. Duncan, H. A. McCullough, and J. M. MacCallum.

As refraction forms a large part of the work of the oculist, this sketch would not be complete without some reference to the development of the manufacture of lenses in Toronto. Charles Potter, with a small factory at 20 King Street East, was the first to supply lenses. These were at first plus and minus spheres and were procured ready surfaced from firms in the United States. The optician edged them on a grind stone turned by hand to fit the small metal frames then in use. The oculist prescribed by focal length. That is, an 8½ lens had a focal length of eight and one half inches. Cylinders were used early in the seventies and were procured from Bausch and Lomb by prescription. Later, a large stock of the various compounds was carried by one or two local optical firms. The first bifocals came into use about the same time and were of the Franklin type, a lens made in two halves and cemented along the horizontal diameter. The first surfacing of lenses to prescription was done in 1901. Since then many improvements have been made and the patient of to-day is supplied with lenses of wonderful perfection within two days after receiving the oculist's prescription.

I have endeavoured, imperfectly, to sketch the progress of our specialty through the early years. I regret that the records are incomplete and in some cases lacking. It may, however, suffice to show how much we owe to the pioneers who blazed the trail and made it possible for us to-day to practise ophthalmology in well appointed offices and hospitals with modern instruments of precision.

THE COST OF MEDICAL EDUCATION.—A study of the reports of 1,161 students attending widely separated and various types of medical schools shows that the cost of medical education to the student for 1929-1930 averages slightly more than $1,100. Tuition and fees and board and room call for 59 per cent of the average total expense. Costs seem to be highest in the schools of the New England and Middle Atlantic states and most reasonable in the schools of the Pacific and Mountain states, with the South Atlantic states following closely.—R. G. Leland in *J. Am. M. Ass.*, 1931, **96**: 682.

Association Notes

Annual Meeting Canadian Medical Association, Vancouver, B.C., June 22, 23, 24, 25 and 26, 1931.

PRELIMINARY PROGRAM

Monday, June 22nd

9.00 a.m.—Registration at Hotel Vancouver.

9.00 to
12.00 a.m.—Meeting of Council, Hotel Vancouver.

1.00 p.m.—Luncheon for Council as guests of Dr. A. S. Monro, President-Elect, at the Vancouver Club.

2.00 p.m.—Meeting of Council.

7.00 p.m.—Dinner for Council at Hotel Vancouver, the Council to be the guests of the Vancouver Medical Association.

Tuesday, June 23rd

9.00 to
12.00 a.m.—Meeting of Council.

1.00 p.m.—Luncheon.

2.00 p.m.—Meeting of Council.

3.00 p.m.—Annual Meeting of the British Columbia Medical Association.

7.00 p.m.—Dinner for Council, as Guests of the British Columbia Medical Association, Hotel Vancouver.

8.00 p.m.—Public Meeting, devoted to Public Health. Speakers—Dr. Douglas Quick on "Cancer"; Dr. D. A. Stewart on "Tuberculosis".

Wednesday, June 24th

8.30 a.m.—Dr. A. R. Munroe, of Edmonton; "Indications for Cholecystic Surgery."

9.10 to
9.50 a.m.—Dr. A. B. Luckhardt, of Chicago. "The Physiology and Pathology of the Parathyroids", Part 1.

10.30 a.m.—Dr. W. J. Kerr, of San Francisco; "Coronary Occlusion."

11.10 a.m.—Dr. W. P. Tew, of London, Ont.; "Some Borderline Problems in Obstetrics."

11.50 a.m.—Dr. Frank S. Patch, of Montreal; "The Importance of Urological Examination in the Diagnosis of Abdominal Conditions."

1.00 p.m.—Boat Trip to Howe Sound.

8.00 p.m.—Official Opening.

8.15 p.m.—The Blackader Oration. Dr. E. A. Park, of Baltimore, on "Rickets."

Wednesday, June 24th—*Continued*

9.15 p.m.—Dr. A. B. Luckhardt, of Chicago; "The Physiology and Pathology of the Parathyroids", Part 2.

Thursday, June 25th

8.30 a.m.—Dr. E. L. Pope, of Edmonton; "Pneumonia Detoxicated."

9.10 a.m.—Dr. A. T. Bazin, of Montreal; "Intestinal Obstruction."

9.50 a.m.—Dr. F. F. Tisdall, of Toronto; "Recent Studies on Nutritional Problems of Childhood."

10.30 a.m.—Dr. Douglas Quick, of New York; "Irradiation Therapy."

11.10 a.m.—Dr. I. M. Rabinowitch, of Montreal; "Diabetes."

11.50 a.m.—Dr. D. A. Stewart, of Ninette, Man.; "What is new in Tuberculosis."

1.00 p.m.—1. Golf at Quilchena and Point Grey.
2. Garden Party at "Shannon".

8.00 p.m.—Dr. D. C. Balfour, of Rochester, Minn.; "Gastric Ulcer and its Management."

8.40 p.m.—Dr. Edward Jackson, of Denver, Colo.; "The General Significance of Visual Tests."

9.20 p.m.—Dr. W. J. Kerr, of San Francisco; "The Value of Quinidine in the Treatment of Cardiac Irregularities."

10.00 p.m.—Alumni Dinners.

Friday, June 26th

8.30 a.m.—Dr. G. S. Fahrni, of Winnipeg; "The Rôle of Iodine in the Management of Hyperthyroidism."

9.10 a.m.—Dr. Emmet McCusker, of Regina; "Infections and Obstructions of the Upper Respiratory Tract in their Relation to the Chronic Chest."

9.50 a.m.—Dr. H. F. Helmholz, of Rochester, Minn.; "Disturbances of the Thyroid Gland in Children."

10.30 a.m.—Dr. I. M. Rabinowitch, of Montreal; "Jaundice; Mechanism of Production and practical Application of Laboratory Methods."

11.10 a.m.—Dr. A. E. Riddell, of Toronto; "Silicosis."

11.50 a.m.—Dr. L. C. Conn, of Edmonton; "Some Clinical Aspects of Disproportion in Obstetrics."

2.00 p.m.—Dr. James Miller, of Kingston, Ont.; "Glomerular Nephritis."

Friday, June 26th—*Continued*

2.40 p.m.—Dr. W. M. Carr, of Victoria, B.C.; "The Value of X-Ray in Preventive Medicine."

3.20 p.m.—Dr. Robin Pearse, of Toronto; "Renal Pain, Diagnosis and Treatment."

4.00 p.m.—Dr. R. D. Defries, of Toronto; "Epidemiology."

7.00 p.m.—Annual Dinner. Commodore Café.

SECTION MEETINGS

Section meetings have been planned for the following sections:

1. Urology.
2. Radiology.
3. Historical.
4. Military Medicine.

Programs for these meetings will be announced later.

LADIES' PROGRAM

MONDAY, JUNE 22ND

A.M. Golf.

Luncheon at Jericho Golf Club to wives of councillors, given by Mrs. A. S. Monro.

Drive and tea at a Country Club by members of the Entertainment Committee.

TUESDAY, JUNE 23RD

A.M. Golf.

Drive to Caulfields on the North Shore, with tea at Mrs. T. A. Spencer's, Hollyburn Ridge.*

WEDNESDAY, JUNE 24TH

Boat Trip for doctors and their wives up Howe Sound.

THURSDAY, JUNE 25TH

A.M. Golf.

Luncheon for visiting delegates' wives at Shaughnessy Golf Club.

Garden Party at "Shannon," the residence of Mrs. B. T. Rogers, for visiting delegates and their wives.

Informal private dinners.

FRIDAY, JUNE 26TH

A.M. Golf.

Women's Auxiliary of the Vancouver General Hospital will entertain visiting ladies of the Canadian Medical Association with a drive and tour of some of Vancouver's lovely gardens.

Tea at Mrs. Gordon Farrell's.

Proposed Dinner Dance for doctors and their wives.

Overseas Nurses wish an opportunity to get in touch with any visitors who may have an interest in their Organization or who may have belonged to their Club, through their Secretary, Mrs. R. Haig, 4537 West 2nd Ave., Pt. Grey, 483Y.

**Note.*—Arrangements for 22nd and 23rd are for wives of Councillors only.

NOTES REGARDING THE MEETING

Convention Headquarters will be the Hotel Vancouver, which will house Commercial Exhibits, as well as all Scientific Sessions.

Registration: The Registration Desk will adjoin the Granville Street Entrance of the Vancouver Hotel. As admission to Scientific Sessions and Entertainment will be by Convention Badge only' members are advised that they must register, as must also the members of their party.

Information: An Information Booth will adjoin the Registration Desk. Here full particulars of all Convention details regarding the Scientific Sessions and the Entertainment plans will be available.

VANCOUVER'S SCENIC NORTH SHORE

Vancouver's North Shore presents a coastline of wondrous beauty broken here and there by tiny harbours and inlets into which pour the turbulent streams from nearby mountains. Good highways, reached from Vancouver by the Second Narrows Bridge or by ferry, enable one to visit the chief points of interest in an afternoon, although one could spend a couple of weeks covering the distance from Deep Cove to Horseshoe Bay, seeing something new every minute of the day.

One of the most scenic spots known in Canada is Capilano Canyon, which, viewed from the Suspension Bridge, presents a vision of grandeur. A turbulence of rushing waters from the mountains through untold centuries has cut a slice from huge rocks, making a chasm, several hundred feet deep, of varying width. In places its pine crested walls are almost sheer, and the river, a milky foam above green jade, swirls its way through great boulders to mingle peacefully with the waters of Burrard Inlet.

Grand Canyon, or Second Canyon, as it is sometimes called, across which a suspension bridge has been built 425 feet above the Capilano River, was once the happy hunting ground of the Squamish Indians, and the favorite haunt of Pauline Johnson, Indian princess and poetess. Pictographs on the flat face of the canyon walls, placed there years ago and recently renewed by an Indian artist, set forth well-known early Indian legends. Flood lights from below the bridge at night reveal its cavernous depth with all the wonders of fern, foliage, rock and river. Other chasms nearby rival Capilano in beauty, the most scenic being Seymour Canyon which is an excellent place to hike to and affords good fishing, and Lynn Canyon, with a splendid suspension bridge from which a magnificent view of Lynn Valley is obtained.

The drive to Horseshoe Bay along the North

Shore of the harbour and English Bay presents a panoramic view of towering mountains and of Vancouver and its harbour along the beautiful Marine Drive. Many pleasure craft are seen at anchor in the bay, and it is found to be an ideal summer resort only ten miles from the City of North Vancouver.

From Grouse Mountain is seen one of the most fascinating sights on the continent—myriads of lights sparkling like jewels caressed in the velvet of night, with the fairy-like lights from the boats mirrored in a sea as clear as glass, while above, the twinkling stars and sometimes the moon cast a glamour over all. To make this wonderful sight available to all, a highway, declared to be one of the finest engineering feats in North America, ascends in variety and picturesqueness to the cozy Grouse Mountain Chalet, 4,000 feet above sea level. Here one may enjoy a delightful dinner and behold in a glorious sunset the City of Vancouver six miles across Burrard Inlet, the wide expanse of the Gulf of Georgia, and the snow-capped peak of Mount Baker in the distance. On the downward grade when darkness falls, one glimpses here and there through the pine trees the vision of sparkling lights which lingers pleasantly in the memories of all who have seen it.

Arrangements have been made for those attending the Medical Convention in Vancouver to visit many such charming spots as described above.

W. J. DORRANCE.

AMENDMENTS TO THE CONSTITUTION

In accordance with a recommendation approved by the Executive Committee, that the Editor of the *Canadian Medical Association Journal* and others should be made members, *ex-officio,* of the Executive Committee, the following amendments to the Constitution and By-laws will be presented to Council at the annual meeting in Vancouver:—

1. Chapter VII, Section 4, which reads as follows:—

> "In order that the business of the Association may be facilitated during the interval between annual meetings, the Council shall appoint a committee of ten from its members, which shall be known as the Executive Committee. The President and President-Elect shall be ex-officio members of this Committee."

shall be changed to read as follows:—

> "In order that the business of the Association may be facilitated during the interval between annual meetings, the Council shall appoint ten from its members to a Committee which shall be known as the Executive Committee. The President, the President-Elect, the Chairman of Council, the Treasurer, the General Secretary, the Editor and the Managing Editor shall be ex-officio members of the Executive Committee."

2. Chapter VIII, Section 1, Paragraph 3, which reads as follows:—

> "The Editor shall be an ex-officio member of Council and shall present an annual report to that body."

shall be changed to read:—

> "The Editor shall be an ex-officio member of Council and shall present an annual report to that body and he shall also be an ex-officio member of the Executive Committee. He shall be reimbursed for his legitimate travelling expenses incurred in attending annual meetings."

REPORT OF THE COMMITTEE ON MATERNAL WELFARE

In view of the importance of the subject it has been thought desirable to publish this report at this time and place.—[ED.]

In the first report of the Committee, presented at the annual meeting in 1929, attention was drawn to the fact that many of the mothers who died had received no pre-natal care and that a large number of the deaths were reported as due to toxæmias of pregnancy and puerperal infection, causes which are largely preventable.

THE NATIONAL COUNCIL OF WOMEN

The Committee drew attention to the necessity for the education of the public and reported with satisfaction the efforts made by the Committee of the National Council of Women in Canada. Their work had undoubtedly awakened interest and has directed the public attention to the necessity of lowering maternal mortality, but like all other educational propaganda it will have to be carried on for a considerable period of time. It must have the whole-hearted cooperation of the doctor.

MEDICAL SOCIETIES

Another suggestion made by the Committee was that in each Provincial, District and County Medical Society, at least one meeting each year be set aside for the consideration of preventive obstetrics. A letter of enquiry was addressed to the Secretary of each of these Societies as to the above, but the response was unsatisfactory in that out of 90 letters sent, only 28 replies were received, and of these 28 only 4 societies had arranged meetings for the consideration of maternal welfare during the year.

EXPENDITURE ON MATERNAL WELFARE

Your Committee have endeavoured to ascertain the total amount spent in each province and in certain large centres of population for Public Health and for Maternal Welfare respectively. Thirty-one letters were sent out and 21 replies were received but it has not been possible in any case to ascertain any separate expenditure for Maternal Welfare. Evidently no public funds are being set aside in any province from which a reply has been received, for special application to Maternal Welfare.

PRE-NATAL CARE

Your committee forwarded a letter of enquiry to 112 hospitals to ascertain how far pre-natal care is carried out in these hospitals.

43 replies were received
4 hospitals have pre-natal clinics
39 hospitals have no pre-natal clinics.

It is evident that adequate pre-natal care is only beginning, but the Committee note that in some cases the reply from the hospital official stated that pre-natal work is done by physicians in their own offices.

EDUCATION OF MEDICAL STUDENTS IN OBSTETRICS

Your committee has made enquiries as to the numbers of hours devoted to the teaching of obstetrics and the number of maternity cases that the students are required to attend during their course. It has been learned that an effort is being made in the different teaching centres to increase the number of teaching hours and to give the student greater clinical facilities in this subject.

RECOMMENDATIONS

(a) Your committee would urge that members of the medical profession should assist in every possible way the National Council of Women, the Women's Institutes and other organizations in their efforts to educate the public in regard to Maternal Welfare.

(b) We recommend that instructions be given to the Post-Graduate Committee to use every effort to have at least one meeting a year in each Provincial an County Society set aside for the consideration of Maternal Welfare.

(c) Your committee would once more urge on every member of the profession not only the advisability but also the absolute necessity of giving every expectant mother adequate pre-natal care.

(d) We recommend that the Hospital Department of the Association be requested to submit a report on the Provincial Inspection of Maternity Homes, Lying-in Homes and Obstetrical Departments of General Hospitals, at the next annual meeting of Council.

ADDENDA

In the study of this subject a great deal of valuable information has been collected. This material has been placed in the hands of the Canadian Medical Association and is available for any member who may desire special information. It includes the following data:—

1. Federal and Provincial expenditures on public health.
2. Details in regard to the activities of the National Council of Women.
3. Detailed information on the organization and conduct of pre-natal clinics in Canada.
4. Standardization of obstetrical departments of general hospitals.
5. Statistics on maternal mortality in this and other countries from 1921 to 1928.
6. Recent researches in the obstetrical field.
7. Standards of puerperal morbidity.
8. The obstetrical work of the Victorian Order of Nurses.
9. Medical and nursing service in various parts of Canada, adequate and inadequate.
10. Excerpts of reports on maternal mortality and maternal morbidity in different cities throughout the world.
11. The most recent research work in connection with puerperal sepsis.
12. A resumé of reports on rural maternity care, trained obstetric nurses, visiting housekeepers and home helps.

All of which is respectfully submitted.

W. B. HENDRY,
Chairman.

Hospital Service Department Notes

FINANCIAL DEPRESSION AFFECTING HOSPITALS

Judging from hospital reports received from various parts of Canada, our hospitals are feeling the present economic depression very severely. This financial difficulty seems to be common in all provinces, but is giving most concern in the West. Just now, when patients with depleted pocketbooks are counting their pennies, the hospitals are finding their better private accommodation relatively idle, while their indigent and paying public accommodations, both of which services are maintained at a loss, are relatively well occupied. Operations of election among the paying clientele are being deferred, and the diminished demand for "special" nurses places a greater strain upon the regular nursing service of the hospital. It is true that the cost of living has fallen somewhat, but this item is but a single factor in the cost of hospital maintenance and is far from compensating for the decreased revenue.

Not only is the decreased patronage in the better wards of concern to the hospitals, but many are reporting great difficulty in effecting collections. Private patients, through actual lack of funds, or because of the peculiar psychological reactions of a depression, are slower in meeting their obligations than hitherto, and even municipalities are dilatory in paying their share of the cost of indigent care. Hospitals report a decreased willingness on the part of municipalities to assume responsibility for patients by admitting residency or indigency. In some districts, particularly in drought areas, tax collections have been so low that the municipalities cannot pay promptly because of the actual lack of funds. This situation is making it very difficult for hospitals to balance their budgets. Very few have been able to set aside any funds for reserve and the majority seem to be faced with increased deficits. As most of our public hospitals are directed by voluntary boards of philanthropically minded private citizens, there are few hospitals which can turn the annual deficit over to the municipal treasurer. In many instances, these public-spirited citizens have had to give their personal

All communications intended for the Department of Hospital Service of the Canadian Medical Association should be addressed to Dr. Harvey Agnew, Secretary, 184 College Street, Toronto.

notes to the bank so that the hospitals could obtain sufficient funds to carry on. Two well-known hospitals in British Columbia have threatened to close down unless the communities reduce their indebtedness. The hospital in one mining town in Ontario was offered to the municipality by the Board for one dollar and was reluctantly purchased, when it was emphasized that the only alternative was the closing of the hospital. While municipal hospitals have not been faced with this possibility, the administrators of these hospitals have found their position very difficult, for any demand for municipal funds that may be reflected in the tax rate stirs up criticism and the perennial demand for an "investigation."

Why municipalities should be so short-sighted in their attitude towards health is hard to understand. Perhaps the necessity to retain public favour rather than to support social progress is the reason. Municipalities oppose every effort to revise hospital acts so that the cost of hospitalization of the indigent patients will fall upon the municipality as a whole, upon the well rather than upon the sick private patients, whose rapidly shrinking purses can ill afford the added drain. Despite the recommendation of the Royal Commission on Public Welfare in Ontario that the non-paying patients should be a complete charge on public funds, this desirable provision was not implemented in the new hospital act, chiefly, we understand, because of the threatened opposition of the municipalities. Also, the proposed new Hospital Act in New Brunswick was strongly opposed by the municipalities before it was withdrawn by its sponsors.

Another cause of concern at this time is the proposed increase in the Sales Tax which, if unmodified in favour of the hospitals, will cost our larger institutions from ten to over twenty thousand dollars annually and the smaller hospitals in proportion. This additional tax, coming at this time with so many hospitals hard pressed, will likely precipitate insolvency for many of the smaller ones with limited incomes.

These financial difficulties of the vast majority of our hospitals are brought to the attention of the medical profession, for it is the opinion of many hospital trustees that, in the interests of still further cooperation and assistance, the medical men should be kept informed of the hospitals' difficult economic situation.

A LONDON HOSPITAL AS A "CLUB HOUSE"

There is one hospital which enjoys the unique distinction of having a steady flow of visitors from the uttermost corners of the earth. This is the Hospital for Tropical Diseases maintained by the Seamen's Hospital Society at Endsleigh Gardens, Euston. This hospital seems to be an international meeting place, for, as narrated in a recent number of *The Hospital*, sooner or later everybody who lives in the tropics comes to the hospital as a patient or visitor, and the daily mailbag contains correspondence ranging from the Argentine to Venezuela.

The office of the Secretary (Superintendent) is probably the world's most curious clubroom. Tea planters from the Far East meet friends who are commissioners, explorers, or Customs officials. These meetings form a "news service" for men who frequently lead lonely lives in the outposts of Empire, and callers, from time to time, are able to give valuable assistance to the hospital authorities in the supply of curious and rare fruits necessary for the treatment of the patients. For instance such fruits as pawpaws and bael, useful in the treatment of sprue and other tropical diseases, are very prone to decay in transit, and usually can be obtained only when brought to the hospital by travellers returning directly from the tropics.

Sufferers from tropical diseases proceeding home, whose condition may be unfavourably affected by a long sea voyage, may break the journey and regain their strength at Queen Alexandria's Memorial Hospital at Marseilles. This is another of the eight establishments of the Seamen's Hospital Society, which from its formation in 1821 until its removal ashore in 1870 was housed in the old *Dreadnought* man-o'-war moored off Greenwich.

CATHOLIC HOSPITALS IN CANADA

The 1931 Directory of the Catholic Hospitals of Canada and the United States reveals a very healthy growth of the hospital activities in Canada. There are listed in Canada 156 Catholic hospitals, with a total capacity of 22,154 beds, not including bassinets. There are now 13 hospitals listed as teaching hospitals, an increase of 3. Forty-four hospitals have been given full approval by the American College of Surgeons, a decrease of 5. Schools of nursing have increased this year from 74 to 75, the number of student nurses increasing from 14,844 to 16,895 (seven schools did not send this information and are not included). Thirty schools have secured educational affiliation, and 4 have lay superintendents of the schools of nursing. Considerable construction is reported, but the data for Canada are not given separately, the combined statistics for Canada and the United States indicating that 93 developmental programs are in process, totalling the large sum of $33,500,000.

SUGGESTED EQUIPMENT FOR THE SMALL HOSPITAL LABORATORY

Many small hospitals in rural districts have made enquiries from time to time with respect to the equipment and supplies which would be required to fit up a small clinical laboratory in the hospital. Dr. W. S. Lindsay, Dean of the Faculty of Medicine of the University of Saskatchewan, very kindly prepared for the

Department of Hospital Service a list of equipment and supplies for such hospitals.

This list includes equipment and reagents for the more commonly performed blood, urine, and gastrointestinal examinations, and for simple bacteriology. Provision is not made for tissue diagnosis. It is presumed that electricity is available; the Bunsen burner is for spirit. The cost of this equipment, according to various quotations, is from $340.00 to $440.00. Copies of this equipment list will be furnished by the Department of Hospital Service to any hospital superintendent or staff member making application.

Provincial Association Notes

THE FIFTY-FIRST ANNUAL MEETING OF THE ONTARIO MEDICAL ASSOCIATION, NIAGARA FALLS, MAY 26th, 27th, 28th, 29th, 1931.

Preliminary Program

Officers 1930–1931—President, Ward Woolner, Ayr; *1st Vice-President,* L. J. Austin, Kingston; *2nd Vice-President,* J. H. Holbrook, Hamilton; *Secretary,* T. C. Routley, 184 College Street, Toronto, Telephone, TRinity 1615; *Hon. Treasurer*—G. Stewart Cameron, Peterborough.

Committee in Charge of Annual Meeting — General Chairman—E. T. Kellam; *Honorary Secretary*—R. F. Eager.

SPECIAL NOTICE

The Committee on General Purposes, comprising the Officers and Board of Directors of the Association, Vice-Counsellors, Chairmen of Standing and Special Committees of the Association, and the President and one delegate per fifty members or part thereof of each affiliated Society, will meet at the convention headquarters, Clifton Hotel, at 2.30 p.m. on Tuesday, May 26th. This notice will serve as the official intimation to all concerned. Delegates will please note the time, 2.30 p.m.

Officers of all affiliated Societies are requested to make arrangements for their representatives or their alternates to be present. It is most important that this Committee, which is the parliament of the Association, should be largely attended in order that the business of the Association may receive proper attention.

GENERAL NOTES REGARDING THE MEETING

Time—The meeting will be conducted on Standard Time.

Headquarters—General sessions of the convention will be held in the Clifton Hotel.

Messages and Mail—All messages, telephone calls, and mail matter directed in care of the Ontario Medical Association, Clifton Hotel, Niagara Falls, will receive prompt attention.

Registration—The registration office will be found in the rotunda on the convention floor of the hotel; and all members, visitors, and ladies are requested to register as soon as convenient following their arrival.

LADIES' COMMITTEE

The Ladies' Registration and Reception Committee particularly desires to meet all visiting ladies. A very special program has been arranged for the wives and daughters, and the Ladies' Committee anticipates that an unusually large number of ladies will be present this year.

ACCOMMODATION

Excellent hotel accommodation is available at the following hotels, for all who make application. The rates are as listed below:—

Clifton Hotel—

Single rooms without bath—$3.50, $4.00.
Double rooms without bath—$5.00, $5.50, $6.00
Single rooms with bath—
$4.50, $5.00, $5.50, $6.00.
Double rooms with bath—
$6.50, $7.00, $8.00, $9.00
(and a few at $10.00).
Club breakfast $1.00. Club luncheon $1.50.
Table d'Hote dinner $1.50.

General Brock Hotel—

Single rooms with bath (one person)—
$3.00, $3.50, $4.00, $5.00.
Double rooms with bath (two persons) (full-size bed)—$5.50, $6.00, $7.00, $8.00, $10.00.
Double rooms with bath (two persons, twin beds)—$7.00, $8.00, $9.00, $10.00, $12.00.
Parlor, twin-bedded room and bath (two persons)— $15.00, $20.00, $25.00.
Small suites of two rooms with connecting bath, full-size bed in each room (four persons)—
$14.00, $16.00, $18.00, $20.00, $24.00 at front of hotel, and
$8.00, $10.00 and $12.00 at back of hotel.

The Fox Head Inn—

Single rooms with running water—$2.00, $2.50.
Double rooms with running water—
$4.00, $4.50.
Single rooms with bath—$3.50, $4.50.
Double rooms with bath—$5.00, $5.50.
Double rooms with bath and twin beds—
$5.50, $6.00 and $7.00.
Connecting suites, four persons, two rooms with bath between—$2.50 and $3.00 per person.

King Edward Hotel—

Double room with bath (two persons)—$4.50.
Double room with twin beds and bath (two persons)—$5.00.
Single room with bath (one person)—$3.00.

Trennick Hotel—

Single room without bath—$2.00.
Single room with bath—$2.50.
Double room without bath—$3.00.
Double room with bath—$4.00.

Please make reservations direct to the hotel at which you wish to stay.

ENTERTAINMENT

Special luncheons and dinners will be held daily.

Those desiring to enjoy golf, bowling, tennis, motor drives, etc., will find that *excellent arrangements* have been made for them.

THE GOLF TROPHY

The beautiful Golf Cup donated by the Hamilton Medical Society for annual competition, open to all members of the Ontario Medical Association, will be played for on Tuesday and Wednesday. Players may start at any time after 10.00 a.m. on Tuesday, all scores to be handed in to the Golf Committee not later than 5.00 p.m. on Wednesday. All members who contemplate taking part in this competition are asked to send in their names and club handicap to the local Honorary Secretary, Dr. R. F. Eager, 975 Valley Way, Niagara Falls. Players must pay green fees and report to the Golf Committee before teeing off. This event is to take place at the Lookout Point Country Club, Fonthill. Fees, $2.50 per day. Privileges have also been granted at the Niagara Falls, New York, Country Club. Fees, $2.00 per day.

ROUND TABLE DINNER

On Tuesday, May 26th, the Round Table Dinner will be held at the Clifton Hotel, commencing at seven o'clock in the evening. Ticket $2.00

LADIES' DRIVE AND TEA

At 4.00 p.m. on Wednesday, there will be a sightseeing drive for the ladies, followed by afternoon tea at the residence of Colonel Oakes.

THE ANNUAL DINNER

The Annual Dinner, to which the ladies are invited, will be held at 7.00 p.m. on Wednesday, May 27th, in the Clifton Hotel. In addition to the Presidential Address from Dr. Ward Woolner, there will be an interesting talk by Dr. Lewellys F. Barker of Johns Hopkins University, Baltimore.

The remainder of the evening will be spent in dancing.

Single tickets, $3.50 (which includes the entertainment).

THURSDAY EVENING SMOKER

Commencing at 8.30 p.m. on Thursday, May 28th, there will be an Open Forum for Members. at the Clifton Hotel, followed by a smoker, Dr. J. G. FitzGerald, of Toronto, will speak on "Health Activities of the League of Nations."

LADIES' BRIDGE

A Bridge Party is being arranged for the ladies on Thursday evening, commencing at 8.30 o'clock, at the General Brock Hotel.

EXHIBITION

The Commercial Exhibits will be found in the room adjoining the Convention Hall. Pay them a visit.

PROGRAM

Tuesday, May 26th

HEADQUARTERS—CLIFTON HOTEL

10.00 a.m.—Meeting—Board of Directors.

2.30 p.m.—Meeting—Committee on General Purposes.

5.30 p.m.—Meeting—Nominating Committee.

7.00 p.m.—Round Table Dinner—Informal. In charge of Committee on Interrelations. Cover charge, $2.00.

Wednesday, May 27th

9.00 a.m.—

"Diagnosis and treatment of malignant tumours of the breast."
G. Stewart Cameron, Peterborough.

"Focal infection."
Duncan Graham, Toronto.

"Malignant disease of the thyroid gland."
E. M. Eberts, Montreal.

"Nephritis in childhood."
Gladys Boyd, Toronto.

"Some border-line problems in obstetrics and gynæcology."
W. P. Tew, London.

"Radium and X-Ray Therapy of Mammary Carcinoma."
Gordon E. Richards, Toronto.

"Coronary thrombosis."
John Oille, Toronto.

"Surgical lesions of the breast."
Dean Lewis, Johns Hopkins Hospital, Baltimore.

1.00 p.m.—Luncheon.
Address by the Honourable Doctor J. M. Robb, Minister of Health of the Province of Ontario.

2.30 p.m.—"Surgery of the bile passages, with special reference to obstructive jaundices."
C. M. Carruthers, Sarnia.

"Laboratory tests and the general practitioner, in the diagnosis and treatment of nephritis." (Illustrated.)
I. M. Rabinowitch, Montreal.

"Hypothyroidism in surgical and non-surgical cases."
Stuart Evans, Ottawa.

"The technique of elective version, with lantern slides."
Irving Potter, Buffalo.

4.00 p.m.—Sightseeing drive for the ladies, followed by afternoon tea at the residence of Colonel Oakes.

7.00 p.m.—Association Dinner and Dance, Clifton Hotel.
Presidential Address.
Ward Woolner, Ayr.

"Diagnosis and treatment of the milder affective disorders (depressions and elations)."
Lewellys F. Barker, Baltimore.

Thursday, May 28th

9.00 a.m.—

"The diagnosis of acute mastoiditis."
John F. Fairbairn, Buffalo.

"Some abdominal crises in infancy and childhood."
H. S. Little, London.

"The treatment of chronic arthritis."
Almon A. Fletcher, Toronto.

"The diagnosis, pathology and treatment of oral cancer."
Harold W. Wookey, Toronto.

"Heart pain."
Geo. C. Hale, London.

"Surgical treatment of the hare lip and cleft palate child."
E. Fulton Risdon, Toronto.

"Radium in gynæcology."
Frank O'Leary, Toronto.

"X-Ray diagnosis of the genito-urinary tract."
W. L. Ritchie, Montreal.

12.15 p.m.—Annual Meeting—Toronto Medical Alumni Association.

1.00 p.m.—Luncheon.

Address—"Light and Power."
The Honourable J. R. Cooke, Toronto.

2.30 p.m.—

"Recent advances in nutritional diseases of childhood."
F. F. Tisdall, Toronto.

"Appendicitis in children."
Thew Wright, Buffalo.

"Fibrositis as a cause of pain and disability."
Geo. S. Young, Toronto.

4.00 to 6.00 p.m.—

Garden Party at The Glen, as guests of the Queen Victoria Park Commission.

8.30 p.m.—Open Forum and Smoker, Clifton Hotel.

Speaker—J. G. FitzGerald, Toronto.
"Health Activities of the League of Nations."

Bridge Party for the ladies, at General Brock Hotel.

Friday, May 29th

9.00 a.m.—

"Protein sensitization."
A. T. Henderson, Montreal.

"How can eye strain cause headache?"
F. C. Trebilcock, Toronto.

"Bronchiectases."
J. H. Holbrook, Hamilton.

"The medical practitioner as a health educator."
A. Grant Fleming, Montreal.

"The situation in Ontario with regard to cancer."
F. Etherington, Kingston.

9.00 a.m.—

"Traumatic disability of the shoulder joint."
Geo. A. Ramsay, London.

"Obstruction of the common duct."
John R. Parry, Hamilton.

Medical Societies

EDMONTON ACADEMY OF MEDICINE

At the regular March meeting of the Edmonton Academy of Medicine the scientific part of the program consisted of a symposium on "Headache", put on by the staff of the General Hospital. The subject was treated in a very thorough and interesting way by Drs. Walter H. Scott, internist, Kenneth Hamilton, neurologist, and Scanlon, eye, ear, nose and throat specialist.

An animated discussion followed the delivery of the three papers, participated in by Drs. Wright, J. W. Scott, Vango, Gillespie, Blais, Hurlburt, Young, Fyfe, Revell, and Magill, of Calgary, who as a member of the Legislative assembly is attending the session of the House and was an honoured guest.

Following the symposium, a film on "Periodic health examinations by the general practitioner in his own office", loaned by the Canadian Medical Association, was, through the courtesy of Dr. Rankin, Dean of Medicine, shown on the screen and was of great interest to the large number of members of the Academy present.

The April meeting of the Academy was held on Wednesday, April 1st, at the Medical Building, University of Alberta.

Dr. Heber Jamieson gave a short address on the subject of "Indian medicine", this being the first of a series he is giving to the Academy on "The medical history of western Canada." This well delivered interesting address indicated careful research and inquiry into all available records on the subject, on the part of the speaker, who illustrated his remarks by a few lime-light views and a number of free marks and articles used by the aboriginal Indian medicine man.

Dr. W. A. Atkinson, recently elected a member of the Legislative Assembly, which he had addressed during the late session of the Legislature on matters relating to the practice of medicine in Alberta, addressed the Academy on the relationship of the medical profession to the government and the public. He prefaced his remarks by a description of State Medicine as now carried on in Russia under the Soviet Government. While there were some advantages to the public under the system now in effect, one of the disadvantages was that the medical

profession in Russia had now been reduced to a condition of virtual slavery under State Medicine. Turning to Canada and the United States, he expressed the opinion that the tendency towards a system of State Medicine was now growing rapidly, and that it behooved the members of our profession to take steps at once to forestall any system which might be inaugurated to the disadvantage of the medical practitioner and not in the best interests of the public. He frankly stated as his opinion that things were not as they should be and that some change was necessary. The subject opened up by Dr. Atkinson was of such intense interest that it was decided to hold a special meeting of the Academy at an early date, when time would be given to a full discussion of the matter. It was felt that as it is possible that some system of State Medicine may be evolved in the future, the members of the medical profession should themselves take the initiative, rather than those outside the profession.

The scientific program of the meeting consisted of a paper by Dr. A. W. Downs, in which he graphically explained the structure and mechanism of the electrocardiograph, using a film furnished by the American College of Surgeons, showing the heart in action and its nervous mechanism and the different parts of the electrocardiograph itself.

Dr. C. W. Hurlburt, cardiologist of the University of Alberta, followed with a paper on "The clinical application of the electrocardiogram," illustrated by a large number of plates of tracings in health and disease exhibited on the screen. Both speakers were complimented at the close of the meeting by the President, Dr. B. R. Mooney, on the highly scientific and interesting manner in which the subject had been treated.

Special Correspondence

The London Letter

(From our own correspondent)

The month of March is nowadays awaited by the lay press with hopeful expectation that the annual report of the Medical Research Council will provide controversial matter enough to hold the public interest until spring fashions and Easter holidays come along. This year, however, there were no fireworks, although to the scientific worker the report contains indications of abundance of good fare. Two points call for special mention and the first of these concerns the question of experimental medicine, about which so much was written last year. At University College Hospital, London, an important change has been made, for the hospital authorities have established within the hospital a department of clinical research, to be directed by Sir Thomas Lewis. The Medical Research Council will continue to be responsible for the financial support of the director and of the work carried out by him in this newly constituted department. This is a direct outcome of the policy of the Medical Research Council, as enunciated in the corresponding report last year, and it is also to be noted that similar movements are in contemplation at other centres of medical work outside of London. At Leeds, Birmingham, and Aberdeen developments are possible, so that the question of clinical research being a scientific possibility ought to be soon answered. The second special feature of this year's report is concerned with certain comments on insulin contained in the introduction. It is a favourite argument with the anti-vivisectionist fraternity that insulin has had no effect on the death rate from diabetes except to increase it! It is obvious to anyone who has been at all accustomed to treating diabetes that the fallacy in these arguments must lie in the way in which death rates were being expressed. This is now made clear, for in a more detailed analysis of the figures the Registrar-General shows that since the introduction of insulin in 1923 the mortality in males from diabetes under 55 years of age has been reduced by 37 per cent, and in females by 21. Between 25 and 45 the rate for males has fallen by 45 per cent. At the same time there has been an increase in mortality over 55 years of age, dating from 1918 when dietetic restrictions came to an end. This increase serves to neutralize the beneficial effect produced by insulin when the crude mortality figures are used. For these elderly cases, moreover, insulin is not used nearly so frequently as for younger patients. The Medical Research Council suggest that taken as a whole insulin is not being sufficiently used for cases at all ages, and 1931 is marked down as a special campaign year, the special centres where official workers are using insulin being asked to supply fuller returns. Unfortunately, education of the lay or medical public is not within the province of the Council and the lay press does not consider the life saving power of insulin as important a subject for its columns as a good riot at an anti-vivisectionist meeting. What is needed is an advertising campaign to urge quite simply "Use more insulin".

The shortage both of trained nurses and of recruits to the nursing profession in the hospitals up and down the country has been getting steadily worse for some time, and in order to sift out some of the wild reasons alleged for this *The Lancet* set up a commission at the end of last year. This commission has recently issued its first interim report. That there is a shortage there appears to be no shadow of doubt. In the smaller non-training schools the shortage of probationers is especially evident, due apparently to the fact that such service is not recognized by the registering and examining bodies towards the total time needed. In the larger hospitals,

and again in the non-training schools, a shortage of staff-nurses is experienced, because nurses seem to look upon this position merely as a short stepping stone to the position of "sister". So far as probationers are concerned, it is felt that some scheme of preliminary training is necessary to bridge the gap between school and the time when the candidate is old enough to enter a hospital. This would also get rid of the difficulty that many young nurses are far too tired by the novel exertions of the first year to benefit by the theoretical instruction given too frequently in "off-duty" hours. It is also urged that propaganda is necessary to counteract the idea, dating from last century, that a nurse is underfed, underpaid and over-worked. The questions of menial work is also considered in this preliminary report, but perhaps the final conclusions should be awaited before drawing too many deductions from the interim views. One effect of this good piece of work by *The Lancet* will be to clear the air and it is especially opportune when politicians are being encouraged to meddle with the rules of work of a very honourable profession.

The text of a bill now before Parliament has just been issued, from which it appears that there is a movement on foot to give osteopaths the right to practise medicine on the same terms as orthodox doctors. Close study of the summaries of this text now available justify the conclusion that if osteopaths have to carry out the courses of study laid down in the bill—providing that orthodox centres of study are insisted upon—then most of the so-called bone-setters of this country had better pack up and leave. The point is that the last thing most of the unqualified tribe of healers want is too much light thrown on their training. If they are to have orthodox training for their own special line, then they will speedily enter the folds of the orthodox and lose the great appeal that they are not as other men. There is not the slightest objection to the osteopaths setting up a private register like the masseurs, but any attempt to claim full medical privileges would not only be foolish from their point of view but it would render valueless the whole purpose of the General Medical Council. It is not likely that the bill will be passed but as a piece of psychology it would be interesting to see exactly the motives behind it.

ALAN MONCRIEFF.

London, April, 1931.

The Edinburgh Letter

(From our own correspondent)

For the tenth year in succession Lord Sands submitted the Annual Report of the Carnegie Trust of the Universities of Scotland. He announced that the Trust are about to review their work in the light of new conditions which have arisen in university education. The three main factors which make this review necessary are the development of public assistance, the increase in the number of students, and the poor quality of many of them. The relation of public assistance to the grants made by the Carnegie Trust is that the Local Authorities rely upon the Carnegie Grant. They supplement what the parents and the Carnegie Trust together can do. The total amount paid by them seems to be about the same as the amount available from the Carnegie Trust. There seems no intention to alter the present activities of the Trust and to divert the grants to other purposes. The Report would rather indicate that it may be deemed necessary to safeguard the true interests of education by imposing some kind of educational test. Lord Sands suggests that it is an unkindness for the Local Authorities and the Trust to send students to a university who are really unsuitable. It would, however, be difficult for Local Authorities to apply the remedy, and it is doubtful if the Carnegie Trust can do so unless the standard of entrance to the universities be raised. Many think that this is sufficiently high already. This raises two important questions. The first is the protection of the universities against over-crowding and against the need of giving elementary instruction. The second is that, supposing the universities can bear the burden, and if it is to be admitted that anyone ought to be entitled to a trial for a degree if he can afford it, is it reasonable that anyone is entitled to get Carnegie Trust or local authority assistance irrespective of his quality as a student? While it would appear that the complaint of poor quality refers more especially to the Arts Faculty, it should not be forgotten that there are failures in other Faculties as well. The Report goes on to draw attention to the unfortunate position of the student who leaves the University after several years' attendance without taking a degree. He has lost time, he may not be able to utilize in a vocation what he has learned, and what he has picked up generally may not compensate for the stigma of failure. There seems to be good reason why both the local authorities and the Trust should, as far as possible, endeavour to avoid doing an apparent kindness, which, if unsuitable, is really an unkindness in facilitating entry to the university. It is now thirty years since the Carnegie Trust was founded and many changes have taken place since then. The changes are not peculiar to Scotland. In other countries the weight of numbers admitted to the universities and certain inadequacies of pre-university training have presented problems similar to those which have arisen here. Lord Sands's review of the activities of the Trust is a model of lucid thinking and literary style, combined with a sound knowledge of his subject. He happily describes the return of fees by former beneficiaries as "conscience money" and the non-return of those fees by others, as a vast floating debt of honour. These touches convert the Annual Report into a very human document.

At a meeting of the Edinburgh Branch of the British Red Cross Society which was held here

recently, Colonel Mackenzie, D.D.M.S., Scottish Command, adversely criticized the military hospital at Edinburgh Castle. He described the building as being poor, too small and difficult to keep clean owing to the smoke of the city. The main strength of the Edinburgh garrison, consisting of a cavalry regiment and an infantry battalion, has been stationed for a number of years at Redford Barracks at the base of the Pentland Hills, about four miles from the centre of the city. These quarters are among the most modern and convenient in the United Kingdom. It is proposed that a new hospital should be built beside the barracks. The War Office is reported to be looking on the proposal with sympathy, although it is unable to promise money at the moment.

The new premises of the Edinburgh University Psychological Clinic for Children and Juveniles was opened on 18th February by the Marchioness of Linlithgow. The clinic is now housed at 37 Morningside Park, in the vicinity of the Royal Hospital for Mental Diseases. Sir Thomas Holland, Principal of the University, presided at the opening ceremony. This clinic was started six years ago, and was intended at that time to be for delinquents. It was, however, discovered that there was a wider scope for its activities, and it was found necessary to get in touch with the pre-school child. Much good work has been done in this direction and it is hoped that this is only the beginning of a still greater sphere of usefulness. With a wider understanding of its possibilities, there is a great opportunity for co-operation with the various departments of school life and health, and with the Sick Children's Hospital.

Sir Alfred Ewing, K.C.B., formerly Principal and Vice-Chancellor of Edinburgh University, has been nominated President of the British Association for 1932. Sir Alfred was born in Dundee 79 years ago. He was awarded the Albert Medal in 1929 and the same year was presented with the Freedom of the City of Edinburgh. At the age of 23 he went to Japan as Professor of Mechanical Engineering at Tokyo. He later became Professor of Applied Mechanics at Cambridge. During the war he held an important post in the department at the Admiralty, being employed in dealing with enemy cipher messages.

Sir Robert Philip was the guest of the Royal Medical Society at its annual dinner. This was held in the Hall of the Royal College of Physicians on 19th February. The gathering was one of the largest the Society has ever had. The Royal Medical Society, which has flourished for nearly two hundred years, meets every week during the winter months. The active members are mainly medical students and recent graduates. Papers are read, debates and scientific discussions are held. The atmosphere is brisk and stimulating and the Society rejoices in the enthusiasm of a robust dialectic. The name of the celebrated Dr. William Cullen is the seventh on the roll of the Society, which contains the names of most of the famous men who have adorned the Edinburgh Medical School at one time or another.

Mr. D. P. D. Wilkie, F.R.C.S., Professor of Surgery at the University, has been appointed a member of the Scientific Advisory Committee on Medical Administration and Investigation. This Committee was constituted last year to advise the Department of Health for Scotland, in applying the results of scientific research to the details of public health administration.

The Cameron Prize of the University of Edinburgh, for 1931, has been awarded to Madame Curie, in recognition of the important therapeutic advances that have been made in recent years as a result of her discovery of radium. The Cameron Prize was founded in 1878 by the late Dr. Andrew Robertson Cameron, of Richmond, New South Wales. The actual value amounts to about £230. It may be awarded annually to any person who, during the preceding five years, has made any highly important contribution to practical therapeutics. The Prize has recently been granted to: 1925, Prof. R. Magnus; 1926, H. Hallett Dale, F.R.S.; 1927, Prof. Frederick Grant Banting, LL.D.; 1928, Prof. Constantine Levaditi; 1929, Sir Leonard Rogers, F.R.S.

The Senatus Academicus of the University has resolved to confer the honorary degree of Doctor of Laws on Sir George Andreas Berry, Kt. M.B. (Edin.), M.P. for the Scottish Universities, formerly Lecturer in Ophthalmology in the University of Edinburgh, and Sir Walter Morley Fletcher, K.B.E., F.R.S., Secretary of the Medical Research Council.

Another link with Lord Lister's Edinburgh days has been severed by the death at the age of 77 of Sir Garrod Thomas, M.D., at one time Liberal M.P. for South Monmouthshire. He was a student of Lord Lister in the old Royal Infirmary. He settled in South Wales and was the prime mover in the establishment of the Royal Gwent Hospital at Newport, of which he was chairman of directors for 26 years.

The Annual Curling Match between the Colleges of Physicians and Surgeons took place at the Haymarket Ice Rink on Wednesday, 25th February. The result was a victory for the surgeons by 37 to 19.

GEORGE GIBSON.
23 Cluny Terrace, Edinburgh.

The Irish Letter

(From our own correspondent)

Epoch-making changes have taken place in the organization of the medical profession in Northern Ireland during the last few months. The medical Benefits section of the National Health Insurance Act, against which the profession held out for so long, has at last been made applicable to the Northern Ireland area. The extension of the Act to Northern Ireland has not been received with universal applause, either by the insured persons or by the medical

profession. The Northern Government, however, has forced the measure through its Parliament in order to bring Northern Ireland into step with the Medical Insurance Scheme in force in England and Scotland. This movement is in line with the general tendency throughout this section of the country for a greater state control of medical services. It is the natural outcome of the events which have given rise to the appointments of an almost endless array of medical officers for schools, factories, and indeed for almost every form of public and private institution. In Belfast alone there are 16 dispensary medical officers; 4 full-time, and 1 part-time school medical officers; 5 full-time tuberculosis medical officers; and 17 other medical officers in varying capacities, in addition to 5 dentists, and a sanitary staff of 4 divisional inspectors and 14 sanitary sub-officers. It would appear from the annual report of the Medical Superintendent Officer of Health (Dr. C. S. Thomson) for the year 1929 that the number of medical officers employed by the Belfast Corporation is to be further increased by appointments to pre-natal clinics, the Tuberculosis Institute, etc. With regard to pre-natal clinics, Belfast appears to have lagged behind other cities in the education of the expectant mother. In Dr. Thomson's report it is stated that there are only three pre-natal clinics in Belfast. In them the number of expectant mothers examined during 1929 was 1,822, out of 8,987 within the city, for the year. How many of the remaining 7,165 received ante-natal care from private medical practitioners is not known, but it is estimated that probably 70 per cent, of expectant mothers received no ante-natal examination or supervision.

The Ministry of Home Affairs (Northern Ireland) has been active with inspections of the different District and County Hospitals. As a result hospital services in the country districts have been greatly improved, and in a number of places disused workhouses have been converted into up-to-date infirmaries, with resident and visiting medical officers. One great difficulty in the development of hospital services is the shortage of nurses. So acute is the matter that the Ministry of Home Affairs (N.I.) has been asked by the Board of Guardians to agree to a reduction in the entrance fee for probationer nurses, from £10, as at present, to £5-5-0, and many hospitals have been obliged to offer increased rates of pay and improved conditions of employment in order to obtain the number of nurses necessary for the successful conduct of the wards.

The Annual Report on Births and Deaths registered in Northern Ireland for the year 1929 has just been issued. It states that the birth rate continues to fall steadily, and that the rate for the year under review, 20.4 per 1,000 of the estimated population, is the lowest recorded for Northern Ireland in recent history. The death rate for 1929 has risen sharply, being 15.9 per 1,000 of the estimated population. This is said to be due largely to deaths from influenza, bronchitis, and pneumonia in the first quarter of the year. The number of deaths from tuberculosis has declined from 3,000 per annum, in 1917, to 1,611 in 1929. A feature of the deaths from this cause is the high rate at certain ages. Of the deaths between ages of 15 and 25 from all causes, more than half are due to tuberculosis. The deaths from cancer number 1,469, which is a slight increase over the number for the previous year. The recorded death rate from cancer has increased over the last ten years. Whether this disease is really increasing has been a subject of controversy for some time. Those who hold the increase is only apparent maintain that improvement in diagnosis accounts for the increase in the recorded cancer rates, while the other side, admitting that improvement in diagnosis accounts for some of the recorded increase, still holds that there is an actual increase. Of the total deaths, numbering 19,822, more than 50 per cent are attributed to the following diseases: heart disease 2,782; tuberculosis 1,611; pneumonia 1,486; cancer 1,469; bronchitis 1,348; cerebral hæmorrhage 1,055. The deaths of infants under one year of age number 2,174; while the number of deaths from sleeping sickness number 37.

The Public Health Report for the Irish Free State has also been issued, and, like that for Northern Ireland, shows a fall in the birth rate. The births recorded were 58,280, and this is the lowest figure ever recorded in the Free State. It represents a rate of 19.78 per 1,000 of the population, which is slightly lower than that for the North. The number of deaths from tuberculosis for the year was 3,875, while ten years previously it was 5,839. The rate per 1,000 of the estimated population has thus been reduced from 1.88 to 1.32. Cancer claimed 3,119 victims, a slight decrease on the previous year, but still higher than the average for the last ten years.

Many improvements have been made in the general administration of Public Health work. County medical officers of health each week now forward to the central department detailed returns of notified cases of infectious disease. In the twelve months considered in the report, there were 29 cases of typhus fever, 304 of enteric, 989 of diphtheria, and 1,148 of scarlet fever. Portions of Co. Kerry which have suffered most severely from typhus in past years have been classified as endemic areas, and a systematic campaign has been organized against this disease. This includes the disinfecting and delousing of the infected houses in each area successively. Although the administration of the Public Health department of the Free State has been considerably improved there is still a marked lack of uniformity in its working.

The best results therefore are not obtained. This, however, is not the fault of the central officers, and it is hoped that the difficulties in the way will be overcome. One step towards this desirable end is the attempt which is at present being made to establish county schemes of pathological investigations at central laboratories. This is also to include arrangements for bacteriological examination of milk and water. If this can be brought to a reality, it will do much towards standardizing the administration.

The great problem at present occupying the minds of members of the various hospital boards is, whether to accept or not to accept moneys raised by the Hospitals Sweepstake Fund. Certain Dublin hospitals have already declared their policy and refuse to accept funds raised in this way, but others gladly accept. It is obvious that the Irish Free State Parliament have no doubts but that all will sooner or later be only too glad to receive funds from it. In the debate on the second reading of the Public Charitable Amendments Hospitals Bill, in which it is proposed to extend to county hospitals the sweepstake benefits, Mr. Fitzgerald, Minister of Justice, said: "It is my intention to introduce into this House a Bill which will be to this effect, that a small committee of experts should be set up to inquire into the eligibility of every individual hospital, the revenue of which is raised by voluntary subscriptions to participate in the scheme. That committee will submit a scheme to me on the basis of which the proceeds of each sweep available for distribution amongst hospitals should be divided."

A curious situation has been created by a legal decision affecting the management of the Grangegorman Mental Hospital (formerly Richmond Asylum). This institution serves Dublin and the county with some other Leinster counties, and the committee of management is a joint body consisting of representatives of several contributing authorities. The Dublin Corporation normally is represented by members of the city council, but in 1925 the powers of the corporation were transferred to three commissioners appointed by the Minister for Local Government. Following that change the question of the proper representation of the Corporation on several bodies presented much difficulty. As a rule the commissioners appointed themselves, since they were responsible for striking the rates out of which contributions were to be made. The legality of the committee of management then formed has recently been challenged and a judgment given by the Supreme Court would seem to support this challenge. It was delivered on the appeal in the case of a number of servants of the committee who maintained that a reduction of their salaries, enforced by the committee, was illegal. Arising out of their case it was declared by the Supreme Court that the joint committee was not properly constituted from 1925 onwards, and that as a consequence the validity of every act of the committee during that period was open to question.

In a report to the present committee, whose constitution is in order, on the effect of the Supreme Court's judgment, the committee's legal adviser mentioned that it would be possible for a number of the inmates of the institution to raise the question of their illegal detention. The Supreme Court indicated that a validating measure would be necessary, and the Minister for Local Government has given the present committee an assurance that one will be introduced shortly into Parliament.

RICHARD H. HUNTER
20 Haypark Avenue, Belfast.

Letters, Notes and Queries

Possession By Devils

[Dr. M. S. Wallace of the Canadian United Church Mission Hospital, at Dhar, Central India, has sent the following interesting and striking case reports on "Possession by devils." —ED.]

"Dr. Grace came to me one day in desperation. A patient in the city had been calling her at the most unearthly hours to be treated for hiccough. It was a case of pure hysteria, but that did not make it any easier. Finally the doctor refused to treat the patient any further unless she was in hospital. I was then besought to go to see if she was fit to be removed. So I went. I applied my stethoscope to her lungs, arms, head and legs before a crowd of ten to twelve men and twice as many women, and gave my expert opinion that the transfer could be safely made. In the course of the morning the woman was admitted in a private room. Bromide mixture and hypodermics had no effect, so I resorted to our old and oft-tried remedy for these cases . . . chloroform. I soaked a mask, and just as she took a deep inspiration with her hiccough, I clapped the mask over her face and held it there. She gradually relaxed, and at the crucial moment I took it off and allowed her to come-to. Immediately she began shrieking 'Porukka moodyathoo' (I can't bear it), until I thought she'd need another dose to cure her of this. However, I, shrieking almost as loudly as she, called her attention to the fact that her hiccough was gone. This had a sobering effect, and she became quiet. Then when I was sure she understood me I assured her that if the attack occurred again I should be obliged to use the same remedy, as she had come to me to be cured; I must do it if I possibly could. She had no return until 5 p.m. when the relatives appeared, at hospital visiting hours.

Then a few 'Hic's' and the nurse dashed after me. I told her to go back and tell the patient if she did not cease at once, I'd come and give her another treatment. She ceased, and left hospital in two weeks, completely free from the devil which she was sure had possessed her.

"A few weeks after this experience, and a similar one with a cousin of hers who lived in the same house, I went to the big Meenakshee Temple here in Madura to see the Brahmin priests cast out devils. It was the first time that I appreciated the *awfulness* of Hinduism. I came away nauseated and giddy, almost ready to faint.

"We saw eight to ten groups with the women in various stages—always women; no men are ever devil possessed! The scene beggars description. In each case there were three priests taking turns in their awful raucous chanting and shouting in the victim's ears — incense burning in a bowl of charcoal at their feet, as they were all seated cross-legged in a small group on the floor. Neighbours and relatives and casual on-lookers, varying in numbers in the various groups, were like-wise seated or standing round.

"At first the woman, quiet and to all appearances as sane as any, sat with arms folded and just listened to the priests; then she began swaying a little and this increased until she had shaken down her hair and she was frantically throwing her body back and forth or round and round in a rhythm maintained by the priests' chants. This continued for hours. The group was without food or water and those whom we saw at the end of ten to twelve hours looked wild and certainly more devil-possessed than any of those who were waiting for the treatment. Every little while some one of the on-lookers would lean toward the woman and shout 'Cholloo'—(tell)—meaning 'tell the name of the devil who is possessing you.' As soon as she does this, the leader of the three particular priests seizes her by the hair and drags or conducts her stumbling and reeling before the Meenakshee shrine, makes her shout something after him and then on to the big tank in the centre of the temple. If she can walk down the eighteen to twenty stone steps, all right; otherwise he drags her down by the handful of hair he has been tightly grasping all this while. She is then plunged into the sacred water of the tank. The devil, his name having been betrayed, rushes up into the lock of hair which the priest then cuts off. The hair is either left at the shrine, or, more commonly, taken back and nailed to the tree from which the devil sprang upon this woman. I was interested to learn that all those whom we asked came from Madura and not from outside villages. Melancholy, violent temper, any kind of hysteria, epilepsy and real insanity are the kinds of 'devils'. It was a most depressing experience. One cannot but help wondering about the permanency of the cure. Personally, I prefer the chloroform method and kind Christian after-care."

Post-Graduate Work

The following letter has been taken from the *Medical Journal of Australia*, March 7, 1931.

SIR: I think it desirable to bring under the notice of the medical profession of Australia the action taken by the Sun Life Assurance Company of Canada. This insurance company has provided, for six years, £6,000 a year. The money is used to send speakers all over Canada to address medical associations and is really a form of post-graduate education. It is interesting to note that in Australia our post-graduate work is effected by bringing the medical practitioners to the cities. In Canada the reverse process has been adopted, owing to the generosity of the Sun Life Assurance Company, who realize the importance of the work from their point of view. (A table then follows giving statistical data regarding the lectures, their cost, number, attendance, etc.)

I am indebted to Dr. Routley, Secretary of the Canadian Medical Association, for this information. Yours, etc.,

JAMES W. BARRETT.

103-105, Collins Street,
Melbourne, February 2, 1931.

Bile in Pneumonia

To the Editor:

Bile is a specific solvent for the pneumococcus —any type, in a dilution as low as 1:300. The solution being affected by virtue of the glycholic acid content.

During the past two years the writer has attempted the treatment of pneumonia with bile preparations. All medication was given by mouth, as the drugs are too irritating to give subcutaneously. Ox-bile, Bacto-oxgall, sod. glycholate and others were used in varying doses after trial doses had been given to normal, afebrile individuals. Very encouraging results were produced by the administration of purified ox-bile in doses of grs. 10 in capsule every hour until 60 to 100 grs. were taken. All patients showed amelioration of symptoms in 12 hours and reduction of fever from 2 to 4 degrees within 24 hours after administration.

Although the series has been too small to permit of scientific conclusions the results justify research. I would be glad to hear from anyone who may have used the same drug, or from anyone willing to undertake animal experimentation.

L. C. LAZERT.

732 Chicopee St., Willimansett, Mass.

Topics of Current Interest

An Extreme Instance of the Toxic Effects of Luminal

The patient whose history is given below seems to have combined in her illness in such a remarkable manner so many of the recorded toxic effects of luminal that we think her case merits publication; a further point of interest is the resemblance of her condition to a progressive infection.

The skin—at one time and another—showed nearly all the features described by Sachs, Caussade and others, Millian, and Menninger; all the visceral and toxic effects—with the exception of hæmatoporphyrinuria, also mentioned by Menninger— were present and, in addition, one or two new features which we have not found described. The mental state recorded by Carlill in his patient who was inadvertently given grs. 120 of luminal in 12 days was not present. In our own experience of this drug we have previously seen macular rashes and confusional states, but never before such a remarkable collection of symptoms and signs.

The patient, a married woman of 47, was given gr. ½ of luminal three times a day for a month for a condition of hyperpiesis, which did not show any evidence of renal involvement. On the last day of the month an urticarial rash appeared on her arms and legs, and the luminal was stopped. The illness which followed lasted about a month and can conveniently be divided into weekly periods.

First week.—The rash, which was at first urticarial, later became erythematous and then morbilliform. Her temperature varied between 99° and 102° F., and she had a good deal of abdominal pain, vomiting, and diarrhœa. Hyperpnœa was a marked and persistent feature and in her urine albumin, ketone bodies, and sugar appeared. At the end of this week an examination of the blood showed: Widal reaction negative; Wassermann reaction negative; blood-sugar, 88 mg. per cent; blood-urea, 28 mg. per cent.

Second week.—The rash became scarlatiniform in appearance and began to fade; the gastro-intestinal symptoms continued, with the addition of rectal hæmorrhage; the pyrexia was maintained. New features were the enlargement of lymphatic glands in the neck, axillæ, groins, antecubital and popliteal spaces, and the appearance of a large and tender liver without any icterus. Bacteriological examination of the fæces at this stage showed nothing abnormal.

Third week.—The rash began to fade and the skin to desquamate, but the patient was very ill, with continued diarrhœa and nausea; the tongue was pale, smooth, dry, and fissured, and both the pyrexia and the albuminuria continued. A second Widal reaction was also negative.

Fourth week. — This marked a general improvement. The gastro-intestinal symptoms began to subside, leaving some abdominal distension; the hepatic and glandular enlargements went; the pyrexia was slight and intermittent. The macular rash reappeared but —in the main—desquamation proceeded steadily. Further examinations at this stage gave the following results: Blood-sugar, 96 mg. per cent; urea, 41 mg. per cent—a rise; cholesterol, 152 mg. per cent; carbon dioxide combining power (van Slyke), 57 vols. per cent. Urine, a trace of albumin; no sugar or ketone bodies; no bile-pigments or excess of urobilin; urea, 3.6 per cent; some pus cells and several hyaline casts. A spectroscopic examination did not show any hæmoglobin derivatives.

After this, general and rapid improvement took place. Glycosuria returned once more, but the blood-sugar remained normal at 88 mg. per cent. The patient was allowed up on the thirty-fifth day, but even after this there was a recurrence of the macular rash.

In the treatment, most of the remedies which were used were designed for the relief of urgent symptoms such as pain, vomiting, itching and sleeplessness; in the more radical therapy—*i.e.*, of assisting the elimination of the drug—we knew of nothing specific, but we were inclined to think that contramine and calcium were of some use. Diarrhœa was the most troublesome feature; many medicines were tried and the most effective appeared to be mist. cretæ co.— R. W. L. Pearson and H. S. Pemberton in *The Lancet*, 1931, **1**: 635.

Olive Oil and Digestion

A paper on the effect of oils on gastric secretion and motility, by W. Morrell Roberts, calls attention again to the therapeutic uses of fat in the form of olive oil in certain digestive disorders. It has been shown experimentally that fats are powerful inhibitors of gastric activity both secretory and motor. Oils act in a peculiar manner in that their inhibitory effect is produced after their entrance into the duodenum. They lessen the normal response of the stomach to food and diminish peristalsis as well as acidity (Roberts). Placed directly into the duodenum through a duodenal tube, fats cause closure of the pylorus and greatly delayed emptying of the gastric contents. They are most effective when given just before meals, since they are then rapidly passed into the duodenum and much diminish the gastric response to food. Oil also seems to have a definitely inhibitory influence upon the psychical secretion, Roberts finds, though it is hard to say exactly how this is brought about. The practical result of this knowledge is that in cases of hypersecretion and hyperperistalsis it is physiological-

ly sound to give oil before a meal. A tablespoonful of olive oil, flavoured if necessary with a little peppermint, before the three principal meals is stated to lessen the discomfort and heartburn which is apt to come on an hour or two after taking food. Olive oil, and other fats, have the further advantage that they cause copious secretion of bile, as can be readily observed by means of a duodenal catheter. Partly because of this, and partly through the action of the fatty acids which are formed during digestion, they are also mildly laxative. In gall-bladder disorders, in which reflex gastric hypersecretion is common, pure fats are theoretically valuable in that they are powerful cholagogues and also lessen gastric activity. There is no evidence that fats as such increase the amount of cholesterol in the bile and they need not therefore be forbidden on the ground that they increase the formation of gall-stones; indeed in many cases of cholecystitis and cholelithiasis fats are well borne, and it would be wrong to withhold exactly those foodstuffs which are more capable of emptying the gall-bladder and biliary system. The use of olive oil, therefore, given fasting, is often recommended in hyperchlorhydria and in cholecystitis. It plays an important part in the success of the courses of treatment devised by Sippy and Coleman.—*The Lancet*, 1931, **1**: 537.

A Smoke Blanket Over a City Warms the Temperature

Marked differences in temperatures between a smoke-covered city and the nearby country have been found by Fred. L. Disterdick of the United States Weather Bureau Service at Des Moines. Comparing minimum temperatures in the city at his office and in the country, only five miles away, he found that on one occasion when the temperature in the country was 35 degrees it was 52 degrees in the city. When conditions in the country were favourable for the radiation of heat from the ground and the city was covered with its usual blanket of smoke, the city was always at least 5 degrees and most of the time 10 or more degrees warmer.

Mr. Disterdick says that at his station they observed some time ago that the minimum temperatures tended to be lower on Sunday and Monday mornings than on any other days of the week, and that, in predicting the lowest temperatures to be expected each night, this has been taken into consideration. It is attributed to the fact that most of the industries, which pour smoke into the air are closed over the week-end, and the air is relatively smoke-free on Sunday and Monday mornings. He points out numerous effects of the warming influence of the smoke.

Calling attention to the fact that smoke pots are frequently used, especially in the western states, to prevent frost damage in orchards, Mr. Disterdick declares that the smoke factor should be considered and that the uncorrected data from smoke-infested cities should not be taken as indicative of the climatological conditions.—*The Diplomate*, 1931, **3**: 19.

Danger from Paint

Facts gathered by a life insurance company of New York indicate that the chewing of paint from toys, cribs, and woodwork constitutes a real danger to children.

Chronic lead poisoning occurs much more frequently among infants and young children than has been generally supposed, and it would be more prominent in sickness statistics but for the fact that it is often unrecognized by physicians. The poisoning usually comes from the sucking or chewing of paint containing lead, although sometimes lead ointments on the breasts of nursing mothers are at fault.

Health officials agree that parents should recognize the danger from this source, and should prevent the paint-eating habit in infants, or else select furniture and toys free of the poisonous lead. Many of the new lacquers and enamels put on with the spray process avoid the use of lead bases, and one of the well-known makers of children's toys advertises that their paints are absolutely harmless. Perhaps the greatest danger lies in the home use of cheap paints containing a large proportion of lead.—*Science News Letter*, Dec. 27, 1930.

The Fees of Specialists

[The following is taken from the correspondence column of the *Medical Journal of Australia*, Jan. 17, 1931.—ED.]

The recent heated arguments concerning the worth of clinical pathologists, combined with the well-known fact that the present economic crisis has removed at least half the income of our specialists, give food for serious thought. It is my opinion, and that of a number of my fellow practitioners with whom I have spoken, that the present fees payable to specialists are not only uneconomic, but also undesirable.

There are some things which perhaps some of your readers may be able to explain. For instance, an eye specialist (for example) confines himself to a small (if highly important) branch of medicine which he studies for a year or two. As a reward he demands that a patient pay two guineas per consultation for the privilege of being treated by him.

I, and other practitioners, do two or three years' hospital work in preparation for work covering every field of medicine. We are, casting modesty aside, of the same relative value to

a patient suffering from food poisoning as is an eye specialist to a patient with a corneal ulcer. However, because our patient chose food poisoning as his affliction rather than a corneal ulcer, he may talk to us for a fourth the price. Why?

Again, I see an infant with gastro-enteritis who is near death. After two weeks' or more skilled treatment, entailing many visits and much anxiety, I will be lucky to get ten guineas, though I undoubtedly save its life. A year later the child develops an affliction requiring surgical treatment, for which a modest fee of twenty to thirty guineas is expected and willingly paid by the grateful parents. My earlier work was every bit as necessary, skilful and successful as the surgeon's work, but I get a third the fee. Why?

Last year I attended a patient who had double pneumonia. When my diagnosis was made to the family they suggested a specialist who came out to our rather distant suburb, was kind enough to say that there was very little other treatment he could suggest, and departed with a fee of ten guineas in his pocket. The patient was very ill four or five days after his visit, so his services were again requested. He honoured me by agreeing with what had been done, told me that death was a matter of a day or two and departed with another ten guineas. I saw the patient all hours of the day and night (at the urgent request of the family) for a fortnight, in spite of which she managed to recover and lived to pay me a fee of nineteen guineas for my work—one less than she paid the specialist for his. Why?

Now, I don't want to be told that specialists have to spend a lot of money training for their particular work and their services are accordingly more valuable. In a discussion I had with a man of my year (now in Macquarie Street), I proved to him quite conclusively that I had spent considerably more money training for my specialty as a general practitioner than he had for his, which dealt with a most limited portion of the body.

Likewise it is no good bringing forward the argument that a specialist is more valuable to the community than a general practitioner. He may seem so, but in reality he is less, seeing that his field is so limited. I am quite prepared to admit (within certain limits) that a person with more skill than myself is entitled to a greater fee than myself. For instance, if I am uncertain of the diagnosis of an obscure condition or want to know the latest method of treatment for an incurable disease, I cheerfully admit that a specialist in medicine is entitled to his fee for knowing more about it than I do. Again, I am prepared to grant that a surgeon is entitled to a reasonable fee for a major operation. But I am not prepared to admit that he is entitled to charge more than I would charge for attending, say, a bad case of gastro-enteritis, unless his skill is so outstanding that he is a better surgeon than the average. And it will leave me quite cold if anyone suggests that he deserves more money for looking at a patient's skin than I get for looking at his tongue.

In short, sir, I beg to suggest that specialists' fees are too high and in some cases iniquitous. It is well known, as I said above, that the position of the greater number of specialists to-day is alarming in its financial aspect, chiefly because the average patient is quite unable to pay the stipulated fee. Of course, I know that a letter from a general practitioner will always be kindly received and that a patient will be treated considerately, even to the extent of being seen for a modest half guinea. And, of course, we all do free work.

In sincerity, I suggest that a wholesale reduction of charges, semi-officially announced, would result in a larger income to all specialists. Many a patient would willingly consult a specialist for fifteen shillings or even a guinea, where he would definitely refuse to spend two or three guineas. Many and many a time I have suggested to patients that they should see a specialist in one department or other, only to be met with the reply that they cannot afford it. And when one considers their position in the social and economic scale one realizes the truth of their assertion.

"G.P."

The Trend of Medical Practice

At the last meeting of the London Jewish Hospital Medical Society, Mr. Somerville Hastings, M.P., delivered an address on "The trend of medical practice." In this he pointed out the tendency in modern medicine to take many branches of practice out of the hands of the family doctor and concentrate them in some form of State organization—for example, preventive medicine and public health, infectious diseases, lunacy, venereal disease, tuberculosis, and maternal and child welfare. The exigencies of research were demanding further centralization in the campaigns against cancer and rheumatism and maternal mortality, and in the grouping of orthopædic cases. This process was bound to continue, partly because it tended to greater efficiency and had contributed much to the improvement in the general standard of physical well-being; and partly because the spirit of the age demanded collective action in meeting its needs. It was being recognized that the team and not the individual was the true unit in medical practice, a principle exemplified in the work of the modern general hospital. The general practitioner should act as a liaison officer, maintaining contact with his patient throughout his treatment and co-ordinating the work of the team. He should have his definite

place in the hospital system, and, in fact, an ideal scheme demanded the institution of district clinics as the places of first resort, rather than the private surgery or the out-patient department of a hospital.—*Brit. M. J.*, 1931, **1**: 470.

Osler's Disease and Eponyms

Last year Dr. Hyman I. Goldstein published an exhaustive bibliographical account of "Hereditary epistaxis: with and without hereditary (familial) multiple hæmorrhagic telangiectasia (Osler's disease)," and concluded that there are probably a total of sixty-five families and about three hundred and fifty individuals suffering from epistaxis with hereditary telangiectasia. He suggested further that cases of familial hæmaturia, hæmorrhagic nephritis, hæmoptysis, gastrostaxis, intestinal and gastric hæmorrhage, and some of the so-called essential idiopathic hæmorrhages are probably different forms of this disease. As a source of reference to the history of epistaxis during the last three centuries, and especially during the last hundred years, this is a very valuable contribution. Doubts may arise about the wisdom of drawing the other diseases into the net of hereditary multiple telangiectasis, to which Sir William Osler in 1907, and Dr. Parkes Weber, both then and often since, have specially drawn attention in this country. The use of eponyms, such as "Osler's disease," is also open to criticism; they have their advantages by avoiding definitions which may subsequently prove to be erroneous, and also by economizing time when the descriptive name is lengthy, as in the case of the condition Dr. Hyman Goldstein discusses, though this argument is somewhat undermined by his quotation of "Rendu-Osler-Weber's disease." On the other hand, eponyms, though attractive to medical historians and hero-worshippers, are a sore trial to the student; they may be very confusing when the name of the same distinguished clinician is applied to more than one condition, such as that of Paget (osteitis deformans; "eczema" of the nipple), von Recklinghausen (multiple neuro-fibromatosis; osteitis fibrosa cystica), and Osler (erythræmia or Vaquez-Osler's disease, and multiple hereditary telangiectases); or when two Wilsons have their names thus perpetuated (Erasmus Wilson's exfoliative dermatitis, and S. A. K. Wilson's progressive lenticular degeneration). It is therefore fortunate that eponyms, as, indeed, some of those just mentioned, tend to drop out of current literature, as is shown by a glance at the heading "Disease" in Dorland's *Medical Dictionary*. Moreover, there is not any rigid custom in the apportioning of eponyms; the name is not always that of the first observer, for it may be credited (and there is some justification for so doing) to the describer who provides the fullest account of a disease which, though previously recorded, had almost escaped recognition. Different countries may apply the names of their own medical leaders to the same disease: an outstanding example of this is Graves's, Parry's, Basedow's, Flajani's disease, or exophthalmic goitre. Leading cases in legal procedure are necessarily known by the names of the parties concerned, but there is not the same reason for the eponymic practice in medicine.—*Brit. M. J.*, 1931, **1**: 365.

Abstracts from Current Literature

MEDICINE

Angina Pectoris. Wood, F. C., Wolferth, C. C., and Livezey, M. M., *Arch. Int. Med.*, 1931, **47**: 339.

The authors of this article present a detailed study of 30 cases of angina pectoris combined with animal experimentation in an endeavour to explain the mechanism of this condition and to note what electrocardiographic changes occur during the attacks. There are two outstanding hypotheses at the present time; first, the coronary hypothesis which holds that the attack of angina pectoris is dependent on a temporary interference with the blood supply of a part of the muscle, and, secondly, the aortic hypothesis which holds that angina pectoris is produced by the distension of the first part of a diseased aorta.

Only true cases of angina pectoris are included in the series, all doubtful cases being discarded. Electrocardiograms were taken several times before, during, and after each attack. In the animal experiments the various coronary arteries were occluded and electrocardiograms were taken before, during, and after occlusion.

Of the 30 cases studied 15 showed temporary ventricular complex changes during the pain. The remaining 15 showed no specific electrocardiographic changes during the attack.

The severity of the pain did not seem to be the main factor that determined the presence or absence of specific electrocardiographic changes during an attack. In the experimental occlusion of a large coronary artery it was noted that at times there was no change in the electrocardiogram; the absence of electrocardiographic changes during the attack cannot be used as evidence that temporary myocardial ischæmia did not occur. From observation of the blood pressure during and after an attack, the authors believe that relief from anginal pain by nitrites does not depend on the drop of pressure which they produce.

In the series of experiments on cats and dogs the factors which seemed to be of importance

in producing electrocardiographic changes were: the vessel that was occluded; the size of the area of the myocardium the blood supply of which was interrupted; the state of the heart before the occlusion; the duration of the occlusion; and the possible simultaneous obstruction of the accompanying veins.

The authors conclude that the majority of attacks of angina pectoris are associated with a localized circulatory disturbance in the heart, but there is the possibility that other mechanisms may produce paroxysms of præcordial or substernal pain. They do not recommend the use of the electrocardiograph to diagnose angina pectoris, and they were unable to evaluate the prognostic significance of specific electrocardiographic changes during the attacks.

W. H. HATFIELD

Congenital Deficiency of the Pericardium. Beck, C. S., *Arch. Surg.*, 1931, **22**: 282.

Beck reports a case of this rare anomaly in a man of 56 years who entered the Lakeside Hospital, Cleveland, complaining of shortness of breath and swelling of the ankles. His general health had been good previously. Dyspnœa developed one month before admission to the hospital. Following this, orthopnœa, a productive cough and œdema of the ankles developed. On examination severe cardiac decompensation was found. His blood pressure was 260 systolic and 140 diastolic. There was generalized arteriosclerosis. The heart was enlarged, with a loud systolic murmur at the apex. His pulse rate was 96 and dropped to 60 per minute after the administration of digitalis. Right-sided pneumonia developed and he died twelve days after hospital admission.

At post-mortem examination it was found that the heart and the left lung lay in a common serous cavity containing about 1,200 c.c. of clear serous yellow fluid. On each side of the heart there was no mediastinal reflection of the parietal pleura, and the entire left ventricle was in contact with the left lung. The pericardium was almost entirely absent. The ventricles were free from adhesions. A fold of pericardium extended across the base of the heart, from the right auricle, to which it was adherent, to the root of the left lung, where it merged with the parietal pleura. A blind pouch of fibrous tissue with a mesothelial lining, and almost completely covering the right auricle, extended from the hilus of the right lung to the diaphragm. A soft pad of areolar tissue and fat, extended posteriorly from the hilus of the left lung across the base of the heart, to the right auricle laterally, ending near the junction of the diaphragm and the blind pouch.

Beck relates in some detail the function of the pericardium concerning which little information is to be gleaned from text-books. Is it essential for the normal functioning of the heart? The reported cases of Moore, Bristowe, Curling, Picchi and Grant are referred to in some of which there was an associated cardiac hypertrophy. In none of these was there evidence that adhesions were the cause of the hypertrophy. From experimental work it has been found that the heart without its pericardium ruptured under a pressure of one atmosphere, but where the pericardium was intact, one and three-fourths atmospheres of pressure were necessary. Other experiments have shown that without the pericardium the heart could not tolerate a dilating force and that hæmorrhage in the cardiac muscle was caused by a slightly increased venous pressure. The pericardium influences the circulation in a marked degree in certain pathological conditions. Beck and Holman produced experimentally an acute plethora by the intravenous injection of blood and salt solution, and demonstrated that the pericardium presented a limiting or constricting action to acute cardiac dilatation. The pulse pressure doubled and the heart greatly dilated when the pericardium was opened. Where there is a gradually increasing tension the pericardium enlarges, to contain either the dilating heart or an increased collection of fluid. The heart decreases in size with an increase of fluid; the venous pressure rises and the arterial pressure falls. Unless the fluid accumulates slowly a fatal tamponade results.

From experimental work, Beck and Moore concluded that following pericardiectomy the general health of the dog was not impaired, the response to exercise did not vary appreciably from the normal, and that dilatation and cardiac hypertrophy did not develop.

G. E. LEARMONTH

Disease Produced and Prevented by Certain Food Constituents. Mellanby, E., *J. Am. M. Ass.*, 1931, **96**: 325.

After referring to the accepted fact that the teeth of animals are greatly affected by the diet during their development, the author applies this to human beings. First of all, is there a relation between the structure of teeth and their liability to caries? Investigation shows that poor structure means more caries, the incisors, being the best proved teeth, showing less than the others. On pushing this idea farther, it appeared that a low calcium diet without vitamin D was usually responsible, for the reason that the formation of secondary dentine failed. Human teeth if attacked by caries produce this secondary dentine if the diet contains the necessary factors.

An experiment was performed on several groups of children, several diets being tried out, milk, eggs, cod liver oil; one group only with irradiated ergosterol. The group without these and with oatmeal added showed four times as much caries in eight months. The group with only irradiated ergosterol showed as good results as any group. The part played by oatmeal seemed to require more investigation, and Mrs. Mellanby after some research is quite clear that cereals are wisely omitted from the diet.

As regards the nervous system it is true that certain deficiencies in diet will lead to a condition resembling subacute combined degeneration. The diet factors were: (1) absence of fat-soluble vitamins; (2) presence of wheat germ. It was concluded that the wheat germ was ergotized, and when ergot was added to diet of dogs this spinal cord condition developed in the absence of fat-soluble vitamins. Irradiated ergosterol did not prevent this condition, but butter, egg yolk or cabbage did, suggesting that vitamin A was the protecting factor. This is also found in carotin (pigment of carrots). Pernicious anæmia in human being seems to resemble the changes produced by this "ergotism." The blood conditions are controlled by liver containing a water-soluble vitamin. Is there a separate cause for the spinal cord changes, or does one factor affect both blood and cord? The fact that some patients have only their blood or cord affected, and not both, would suggest two causal factors, one water-soluble and one fat-soluble. The former appears to cause the blood changes and the latter the cord degeneration.

The relationship between vitamin A and infection has been clearly established. Cod liver oil prevents, and the absence of it or some such factor permits, the development of various conditions which attack those with lowered resistance. Carotin seems to supply any necessary vitamin A, if enough is given. When applied to the prevention and treatment of puerperal infection definite benefit appeared to result, although it is still too early to make confident statements.

P. M. MACDONNELL

The Effect of Irradiation with Ultra-violet Light on the Frequency of Attacks of Upper Respiratory Disease (Common Colds). Doull, J. A. *et al., Am. J. Hyg.,* 1931, 13: 2, 460.

This study, supported by a grant from the John J. Abel Fund for Research on the Common Cold, is a valuable contribution to a discussion which has been going on for some time relative to the value of irradiation with ultra-violet rays. The cooperation of 363 adult volunteers, all of whom were professionally, and therefore, intelligently, interested, was secured, and the facilities for the study were excellent. The amount of radiation was carefully controlled by bi-weekly testing of the lamps used and by keeping the dosage at the level of the minimal erythema dose—irradiation being regulated as closely as possible to suit individual sensitivity. The proportion of individuals known to be susceptible to colds was practically identical in the irradiated and control groups. All volunteers were under observation for a period of thirty-five weeks. Seemingly every effort was made to assure a perfectly fair test. The results show a slightly greater incidence of colds in the irradiated group, and the proportion of severe cases was as high in this group as in the control group.

W. H. HATTIE

Pulmonary Lesions in Rheumatism. Findlay, L., *Arch. Dis. in Child.,* 1930, 5: 259.

Inflammations of the lung, and especially of the pleura, have been ascribed by many writers to the rheumatic virus. Findlay believes that there is no justification for the assumption of a rheumatic pneumonia or rheumatic pleurisy. He analyses his records of 25 cases of rheumatism in which there was a pulmonary complication. In 15 cases there was a pleural effusion, in 4 an intercurrent pneumonia, in 3 a terminal bronchopneumonia, and in 2 hypostatic congestion. Carditis was present in every case —in 16 cases pericarditis with effusion, and in 8 cases endocarditis.

In the 16 cases of pericarditis, the most frequent pulmonary complication was pleural effusion, left-sided in 9 cases, right-sided in 3. In the 8 cases of endocarditis, there was pleural effusion in 3, all left-sided. The effusion was in every case a transudate, the cellular elements being predominantly endothelial. The occurrence of the effusion 12 times on the left side and only 3 times on the right is not in conformity with the prevailing belief that passive transudate in failing heart occurs first on the right side.

Findlay concludes that the rheumatic poison shows no predilection for the pleuræ or the lung; the commonest pulmonary complication is pleural effusion, invariably a transudate; lung lesions may be of the nature of an intercurrent pneumonia or a terminal or hypostatic bronchopneumonia.

A. K. GEDDES

Abdominal Symptoms in Acute Rheumatism. Giraldi, J. J. J., *Arch. Dis. in Child.,* 1930, 5: 379.

The author states that the subject of abdominal symptoms in acute rheumatism has gone through three phases: among the older writers it was well known and much debated; then came a period notable for its absence from the literature; this in turn was followed by a

recent awakening interest in the subject. Giraldi discusses the subject under three headings: a digestive group, a group simulating acute appendicitis, and a group with a peritonitic picture.

Under the digestive group, he reports four cases in which the first appearance of definite rheumatic symptoms was preceded by an attack of nausea or vomiting, abdominal pain and diarrhœa.

Under the pseudo-appendicular group, a case is reported of an eight-year old girl with all the signs of acute appendicitis. The appendix on operation showed only slight œdema. Three days later, a typical attack of acute rheumatic arthritis appeared, beginning in the wrist and progressing to endocarditis.

Thirdly, under the peritoneal group, a case is reported of a nine-year old girl admitted with signs of general peritonitis. The abdomen was immediately opened; the appendix was normal and there was free fluid in the peritoneal cavity. The temperature and pulse rate remained elevated and ten days later multiple arthritis and endocarditis was evident. The author believes this to be an instance of peritoneal reaction to the rheumatic infection.

In each group summaries are given of similar cases reported in the literature. The following conclusions are submitted. Abdominal symptoms precede the onset of acute rheumatism not infrequently; acute rheumatism sometimes gives rise to symptoms simulating acute appendicitis; not infrequently, in acute cases, the rheumatic virus invades the peritoneum.

A. K. GEDDES

SURGERY

Actinomycosis of the Abdomen. Good, L. P., *Arch. Surg.*, 1931, **22**: 307.

Good has been unable to substantiate or contradict the two present-day theories in regard to the mode of infection by actinomycosis, either that the microörganism is carried into the tissue by foreign material, such as straw, or that the microörganism is already present in the mouth and that an injury such as a straw is likely to cause, serves as a portal of entry. He enumerates the sites of the primary abdominal lesions in sixty-two cases. The appendix alone was the location in 77.5 per cent of the cases, and involved with the sigmoid colon, the gallbladder, with infection in the pelvis, in a diverticulum, and in the tonsils in an additional 12.8 per cent. The sigmoid colon, the right groin, the right upper quadrant, and the abdominal wall were affected in the remaining small percentages. It may be assumed that the ray-fungus is probably caught and remains at a point of stasis, such as in the ileo-cæcal region or in a diverticulum, from which it gains entry into the intestinal wall as a result of injury to the mucosa.

The disease may be acute or chronic. In the latter type there are seldom any symptoms, and of frequent occurrence is the presence of a mass in the right lower abdomen, the only evidence of an existing lesion. With pain from secondary infection there appear fever, malaise, and tenderness. In a large number of cases this invasion occurs early. Hence the acute form is met with more frequently than the chronic. Signs of acute appendicitis will be present and at operation an appendiceal abscess is often found and drained. The patient will in most instances go through an apparently normal convalescence. A few weeks after operation fever and chills may develop, and the patient may feel weak and look toxic. An area of tenderness will be found in the wound, or in the flank or in the right renal region. An abscess has formed from which when drained a sinus develops and drains over a long period. The nature of the disease is not recognized, and various means may be adopted to bring about healing, which may occur, but only temporarily. The actinomycotic infection has during this time spread along the fascia, peritoneum and muscle fibres, with brawny tissue in its wake, and abscess formation, if there has been resistance to its spread. Involvement of the abdominal viscera may be extensive. The infection may enter the blood stream late in the disease and metastatic abscesses may develop in any part of the body.

In early recognition lies the chief hope in the treatment of abdominal actinomycosis. At the Mayo Clinic surgical, medical, x-ray and radium are used in the treatment. Of advantage is a combination of the various methods. An endeavour is made to build up the general health of the patient. Massive doses of a saturated solution of potassium iodide are administered. Of the 62 cases studied, 29 have died, 7 have not improved, 6 have improved. In 12 cases, no follow up data could be obtained. The disease has apparently been arrested in 8 of the patients.

G. E. LEARMONTH

Peritonitis. Meleney, F. L., Harvey, H. D., and Jern, H. Z., *Arch. Surg.*, 1931, **22**: 1.

This extensive contribution is a study of 106 cases of peritonitis in which the authors endeavour to demonstrate the correlation of the bacteriology of the peritoneal exudate and the clinical course of the disease. The literature is reviewed from the time of Grawitz, who in 1879, in his studies on peritonitis, concluded that there was a group of primary infections of the peritoneum and another which was secondary to other lesions; on the one hand, those which seemed to arise as a disease entity of the peri-

toneum itself, and on the other those which developed by contiguity from disease of the intra-abdominal organs. In the present study interest has been centred almost entirely on the peritoneal exudate and the bacteriological methods which the authors followed are given in much detail. Bacteriological examination was made of the peritoneal exudate taken at the time of operation. The conditions at this fixed point of time in the course of a pathological process were studied, as well as the clinical history from the beginning to the end of each case, to see what could be logically correlated in the clinical picture with the condition at the moment of examination. Their results tend to confirm those of previous investigators in this field who established the facts that are the basis of present day methods of treatment.

Certain facts have been deduced fairly convincingly by their investigations. Lesions of the appendix are the cause of peritonitis in the great majority of patients who are admitted to a general hospital. If the peritonitis is limited in extent, very few organisms are found in the peritoneal exudate. If there has been no perforation of the appendix the disease is usually not fatal, even if the appendix is gangrenous or simply inflamed. Extensive peritonitis is of frequent occurrence if the appendix has perforated. The peritoneal exudate is profuse and large numbers of bacteria of several different species are found. The disease in these cases is often fatal. The course is stormy, and if the patient recovers the stay in hospital is about twice as long as where there has been no perforation. When the appendix is gangrenous, no evidence was found, from an examination of the peritoneal fluid, that the spore-forming anærobic bacteria, either pathogenic or non-pathogenic, are particularly active. Following perforation in only 40 per cent, or 12 of 30 cases, was the *C. Welchii* found, whereas *B. coli* was found in every instance. In 9 cases of gangrene of the appendix without perforation *C. Welchii* was not found once. Of the 6 fatal cases of perforative appendicitis *C. Welchii* was found in only 2 or 33 per cent. Perforative lesions of the small intestine early gave severe symptoms. In perforations of the upper intestinal tract organisms were not usually seen on smear, and early cases yielded no growth. Perforations of the lower small intestinal tract were invariably fatal. The peritoneal exudate was usually profuse and turbid; many organisms were seen and all yielded bacterial growth. Slow development of symptoms characterized perforative lesions of the large intestine. They occurred in older people, and more bacteria were found both in smear and in culture, including *C. Welchii* which was invariably present. Four out of 5 of the patients recovered. In the authors' series of perforative lesions of the gallbladder every case was fatal. Bile will cause a peritonitis, even if sterile; microörganisms will appear in the peritoneal exudate.

Diffuse peritonitis was rarely found in patients with symptoms of less than twelve hours' duration, but usually in later cases. These cases were more severe than when localized peritonitis was present; the peritoneal fluid was profuse and many organisms were seen on smear and recovered on culture. Moreover there were frequent complications, and one-third of the patients died. With abscesses the disease was of long duration, the symptoms moderately severe. The fluid was thick and contained many organisms. The mortality was one-half that of the diffuse group. The three commonest microorganisms found were *B. coli*, *S. viridans*, and *C. Welchii*. Of prognostic value were peritoneal fluid smears made at the time of operation and compared with the culture. Every patient recovered where smears showed no organisms and cultures yielded no growth, and when fewer species appeared in culture than were seen on the smear. There was potential danger where more kinds of organisms appeared on culture than were seen on the smear. More than one-fifth of these patients died. More than one-quarter of the patients died when all of the forms seen on the smear were positive on culture.

Dividing the cases of peritonitis into groups according to the number of bacteria appearing in the peritoneal exudate, 35 cases yielded no organisms; 11 produced one; 14 yielded two and 15 three, 19 four, 9 five and 6 three species. In the majority of cases yielding no growth the disease was limited to the focus of infection. When viable organisms were present there was an acute diffuse peritonitis. There was a steady increase of severity according to the number of species present. The outstanding bacterial species found in their series of peritoneal exudates were the non-hæmolytic *B. coli*, present in 87 per cent in which bacteria were found, the *S. viridans* in 49 per cent, and *C. Welchii* in 38 per cent. The total number of bacteriological groups isolated was 23. The disease was worse in almost every respect when more than one organism was present than when there was a single organism. Their evidence seems to show that *C. Welchii* and the other spore-forming anærobes, as well as the anæcrobic streptococci and diphtheroid bacilli, do not increase the severity of the disease or increase the chance of a fatal outcome. The factor of individual resistance to peritoneal infection is an important one and has an effect on the outcome of this disease.

G. E. LEARMONTH

Vaccination Against Peritonitis in Surgery of the Colon. Rankin, F. W., and Bargen, J. A., *Arch. Surg.*, 1931, **22**: 98.

A previous report by the authors on this subject (*Arch. Surg.*, 1929, **19**: 906), included 61 cases of tumour of the colon resected following intra-peritoneal vaccination at the Mayo Clinic. In this group there was a striking reduction in the mortality rate compared with the control group. They concluded that this was an important preventive measure against the peritonitis which causes death in over half of these patients. The number of cases in which vaccination and operation have been done has been increased to 300 at the Mayo Clinic. Experimental results recently obtained by Kellum in Rosenow's laboratory suggest that the introduction of a mixed vaccine of colon bacilli and streptococci influences the mortality rate to a marked degree, by increasing the immunity to infection and heightening the threshold of surgical safety.

The reasons given why peritonitis develops so frequently are: (1) the peculiar conformation of the large bowel which differs from the small intestine anatomically and physiologically; (2) the increased permeability of the large bowel when attacked by malignant disease, due either to the peculiar structure or to mucosal injury produced by large ulcerating carcinomas; and (3) the general condition of the patient, as evidenced by the debilitated, and generally lowered resistance of patients who harbour neoplasms. The colonic musculature is much thinner than that of the small intestine and the tunica propria is frequently replaced by fat. Owing to the strong peristaltic action of the large bowel strain is placed on the suture lines with consequent leakage and peritonitis. Other factors are the inconstant blood supply, and, occasionally, the independable anastomosis between the arcs, as well as the increased permeability of the colon when there is obstruction. These also bear a direct relationship to peritoneal contamination. The causal factors of increased permeability and of spreading contamination are mucosal injury and stenosis at the site of the growth. Cultures from eighteen malignant colonic lesions, immediately after removal, showed that the statements made regarding infection of the peritoneum in close proximity to the growth are correct.

The strictest aseptic precautions were observed in resecting the tumour. Material was aspirated with a Pasteur pipette from under the serosa of the tumour, and then transferred to dextrose-brain broth and shake-cultures were made with blood agar. The carcinomatous regions from which cultures were made involved the cæcum, ascending colon, hepatic flexure, splenic flexure, descending colon, rectosigmoid and rectum.

In 72 per cent of the lesions cultured growths only of *S. viridans* and *B. coli* were obtained; in 17 per cent there was no growth, while cultures of the remaining 11 per cent were indeterminate. Hence the preponderating microorganisms are *S. viridans* and *B. coli* and the production of immunity against them has already been referred to in the work of Kellum.

In carrying out the preventive measure, the vaccine prepared from streptococci and *B. coli* obtained from the peritoneal exudate in a case of peritonitis is injected in physiological solution of sodium chloride with a dulled spinal puncture needle two and five days, sometimes twenty-four hours, before operation. Certain other measures, such as cleansing of the colon and rectum, the giving of a residue free diet, consisting primarily of fruit juices and candy up to 3,000 calories during every twenty-four hours were adopted. A laxative is given and the colon is irrigated with normal saline solution. Other adjuvant measures used were blood transfusions, control of carbohydrate metabolism and of urinary dysfunction, prevention of upper respiratory tract infections. The authors are of the opinion from experimental laboratory and clinical experience that peritoneal vaccination is of much importance in preventing post-operative peritonitis in malignant lesions of the colon. Rankin and Bargen summarize 222 cases in which vaccine was given and 58 cases in which no vaccine was given. It is worthy of note that of the 222 patients operated on only 11 died from peritonitis. Many had two or more major operations performed. Besides, very extensive operations were required in greatly debilitated patients. Of the 58 patients who did not receive vaccine 13 died of peritonitis. Lesions of similar situation and nature were present just as in the 222 patients who received vaccine. The operations performed on the 13 fatal cases included 4 abdomino-perineal resections, 1 Mikulicz operation (first stage), 1 ileostomy, 1 cæcostomy, 1 colostomy, 1 ileocolostomy, 3 posterior resections of the rectum, and secondary resection of a lesion of the descending colon.

G. E. LEARMONTH

OBSTETRICS AND GYNÆCOLOGY

The Treatment of Hyperemesis Gravidarum. Van Wyck, H. B., *Am. J. Obst. & Gyn.*, 1931, **21**: 243.

All cases of nausea and vomiting of pregnancy have a common underlying cause. No satisfactory distinction can be made between toxic and neurotic vomiting. The publication of the theory of carbohydrate deficiency as the primary cause of nausea and vomiting resulted in the rapid spread of the treatment by carbo-

hydrate administration. The introduction of the intravenous method by Titus marked a great improvement in treatment. During the past three years the treatment adopted at the Burnside Department, Toronto General Hospital, has been to give 3000 c.c. of 10 per cent glucose in normal saline daily in addition to whatever the patient could take by mouth. The flow is regulated at 600 c.c. of 10 per cent glucose per hour. This amount is given daily and continued until the patient is able to take sufficient water by mouth to maintain a large urinary output. This treatment combined with such sedatives as heroin, morphia and bromides, with attention to the bowel elimination, and isolation has been effective. Mouth feeding is begun as soon as possible with light foods. The length of time the patient is allowed to convalesce under hospital conditions is important, as patients discharged too early tend to have very serious and obstinate relapses.

In obstinate cases, not recovering on the usual administration of intravenous glucose with the usual large amount of fluids, there is always a persistent urobilinuria, and this can be interpreted as evidence of persisting liver damage. To correct this the duodenal tube was used and feedings of 3 oz. of skimmed milk and 3 oz. of 10 per cent glucose were given every two hours throughout the twenty-four. This gives 780 additional calories to the patient as well as 2000 c.c. more water. In the absence of adequate laboratory facilities, urobilinuria may be assumed to be present when the urine has a characteristic orange red colour. When the colour persists in the urine in spite of adequate treatment, this may be taken as an indication of serious and progressive liver damage. A substantial saving of fetal and maternal lives will be made when our public institutions provide facilities for the special nursing and complete isolation of each case of hyperemesis, including indigent patients.

The author's conclusions are that the four factors, starvation, dehydration, hepatic derangement and neurosis demand treatment by rest in bed with isolation, sedatives, intravenous 10 per cent glucose in normal saline in amounts up to 3000 c.c. daily until the urine is increased to at least a litre, and the use of larger amounts of carbohydrates and protein by the duodenal tube in certain cases. The first two are used to overcome the neurosis, the third the dehydration, and the fourth, the hepatic derangement. The same principles indicate the prophylactic measures which should be used in the treatment of early mild nausea and vomiting.

ROSS MITCHELL

Certain New Observations on the Action of the Anterior Pituitary. Kraul, J., *Am. J. Obst. & Gyn.*, 1931, **21**: 301.

Pituitary glands obtained from rabbits, guinea pigs, rats and mice which had been treated with placental extract, placental tissue, corpus luteum hormone, folliculin, and urine of pregnant women, were implanted into immature mice. More lutein tissue and pseudocorpora could be seen in the ovaries of such mice, as compared with those obtained from animals into which normal pituitaries had been implanted. The promotion of follicular growth by the pituitaries of animals treated with folliculin or placental tissue was variable but occasionally increased. This phenomenon was even less pronounced after injections of placental extract, corpus luteum hormone, and urine of pregnant women. Injections of suprarenin did not increase the lutenizing action of the pituitary in transplants. Implants of guinea pig, cat, and rat placenta into immature mice had only a slight effect on the ovary.

X-ray irradiation of the head did not increase the luteinizing power of the pituitary gland. On the other hand the pituitary of animals whose ovaries had been previously irradiated caused a distinct luteinization of the ovaries of immature mice. The continuous administration of corpus luteum hormone, placental extract, or tissue folliculin and urine of pregnant women in adult rabbits, guinea pigs, rats or mice, caused a luteinization of varying degree, attended with an alteration or a suppression of the ovarian cycle. The anterior pituitary does not store hormones. The human placenta at term does not contain corpus luteum hormone. The yellow body had a certain degree of independence of the ovum, as is shown by its continuing to function after removal of the latter.

By the use of extracts of the anterior pituitary body various investigators have shown that there are two different hormones in the anterior pituitary body acting on the ovary. One stimulates the development of follicles, the other activates the lutein tissue. The writer shows that the whole gland can produce both effects. The anterior pituitary itself is influenced by endocrine substances of the ovary and placenta. Consequently, the anterior pituitary does not absolutely control the ovarian cycle. On the other hand a cyclic function of the anterior pituitary, due to this reciprocity, is quite probable but not yet proved. The injection or implantation of various substances may act either directly on the ovary of the immature mouse, or only indirectly by having acted simultaneously on the pituitary gland of the test animal.

ROSS MITCHELL

PÆDIATRICS

The Relationship of Throat Infection to Acute Rheumatism in Childhood. Schlesinger, B., *Arch. Dis. in Child.*, 1930, **5**: 411.

In this paper Schlesinger brings forward proof that relapses in rheumatism are largely precipitated by acute, and often extremely mild, throat infections. At West Wickham Hospital for children with rheumatic heart disease, he observed epidemics of acute throat infections in 1927, 1928 and 1929, involving 62 out of a total of 485 children. In 22 of the 62 cases, after a quiescent period of 10 to 21 days following the throat infection, a relapse of the rheumatism occurred. The rheumatic manifestations varied from mild to severe, and the quiescent period of 10 to 21 days was almost constant. All the children had been free from active rheumatism for months beforehand. The number of tonsillectomized and non-tonsillectomized patients in the hospital were approximately equal; there were fewer throat infections in the tonsillectomized children, but of those that occurred 50 per cent were followed by rheumatic relapses, whereas only 30 per cent of the non-tonsillectomized suffered rheumatic recurrences.

No one type of organism seemed responsible for the epidemics. At Cheyne Hospital in London it was also noted that relapses of rheumatic fever were preceded by mild throat infections with a quiescent period intervening. Among 485 patients, in only 6 cases did the author observe rheumatic relapses apparently unassociated with preceding throat infection.

In scarlet fever, also, the arthritic complication most often appears after an interval of 10 to 21 days from the primary throat infection. The analogy with serum sickness is discussed. Viewing rheumatism as an allergic reaction to a streptococcic antigen, it is possible that a throat infection in a rheumatic patient induces a hypersensitive state, and that this hypersensitivity is maximal from the tenth to the twenty-first day, at any time during which a reaction in the form of an attack of rheumatism is liable to occur.

The decreased incidence of throat infections among the tonsillectomized is offset by the increased liability to rheumatic relapses when pharyngitis does occur. The rheumatic patient with established heart disease is often better served by a pair of septic tonsils than by a healthy throat. The author believes that tonsillectomy in these children should be reserved for those whose general health is being adversely affected by the chronic focus of infection in the throat. (Note that this study is not concerned with *first* attacks of rheumatism).

The problem of the rheumatic child is the unsolved problem of prophylaxis against upper respiratory infections. Schlesinger found that aspirin, given in large doses for some weeks after the onset of throat infection, was of value in the prevention of serious rheumatic recurrences.

A. K. GEDDES

The Tonsils and Nasopharyngeal Epidemics. Bradley, W. H., *Arch. Dis. in Child.*, 1930, **5**: 335.

This admirable study does not lend itself to summarizing, but is to be strongly recommended to every physician interested in tonsil and upper respiratory infection, for in this thesis he will find much close observation, stimulating discussion, provocative conclusions, and—if these be not enough—literary charm.

The essay is the report of an investigation into the relative incidence of droplet infections upon children whose tonsils and adenoids had been removed, compared with children who had not undergone operation. The material observed was a public school for boys from ten to eighteen years of age. The enquiry concerned 289 boys and resolved itself into two parts; the condition of their throats in health, and the incidence of catarrhal disease among them. A few brief extracts from the author's summary and conclusions follow:—

"A survey of the throat appearances of healthy school boys shows that tonsillectomy fails to eradicate tonsillar tissue in the bulk of cases. Reduction, by operation, of the amount of tonsillar material is followed by a compensatory hypertrophy of other lymphoid tissue in the neck. Until this compensation has occurred there is an increased liability to catarrhs and their complications in the susceptibles. The findings suggest that there is an optimim amount of lymphoid tissue necessary for the protection of the body from nasopharyngeal diseases and their complications."

"That most extensive and ubiquitous group of diseases, the droplet infections, has little to do with the tonsil or its removal . . . . Tonsillectomy is symptomatic treatment in its most elementary form, and its extensive application has produced no obvious beneficial result in the control of acute nasopharyngeal infections".

"Chronic tonsillitis is a complication of acute nasopharyngitis. Autogenous reinfection from septic tonsils is not common. It is discussed and the necessity for operation in these circumstances emphasized."

"It has been suggested that the common cold is the expression of an abortive reaction to infection, no matter what the infecting organism . . . A tentative statistical proof that coryza and febricula are 'formes frustes' of the stationary fevers of a community is presented."

A. K. GEDDES

UROLOGY

The Value and Limitations of Uroselectan as an Aid in Urological Diagnosis. Bugbee, H. G., and Murphy, A. J., *J. Urol.*, 1931, **25**: 275.

The authors caution against the over-enthusiasm which one so often sees in regard to any new procedure, leading to its application where it is not suited and by those not qualified, with misleading results. A series of 26 cases is reviewed, and it is shown how the upper urinary tract can be demonstrated in cases where a cystoscopic examination could not be made, and particularly in children. Interesting facts regarding the function of the kidneys, the dynamics of the urinary tract and ureteral stricture, the absence of a kidney, and various other anomalies have been shown. On the other hand, only in those cases in which a cystoscopic examination was mechanically impossible, and in one child in whom other conditions did not warrant surgery at the time, was the information obtained by this method sufficient without cystoscopic confirmation. The author therefore feels that while a remarkable addition has been made to the field of urology through the painstaking work of the pioneers in this technique, yet it is primarily a method of corroboration to be employed as a supplement to our present known methods, except in the very limited number of cases in which cystoscopic manipulation is impossible. Here it gives much valuable data otherwise unavailable, but when such data are unsupported by cystoscopic information the interpretations must be made with extreme care and conservatism.

N. E. BERRY

Sterility in the Male. Hagner, F. R., *Surg., Gyn. & Obst.*, 1931, **52**: 330.

Reliable statistics estimate that the male is at fault in about one case of childless wedlock in six. The principal causes which must be considered are: absence of sperm due to congenital defects; oligospermia, where the spermatozoa are few and motionless; anatomical defects which prevent the passage of semen through the urethra, *e.g.*, hypospadias, fistula and stricture; incompatibility, or an apparent lack of affinity of one cell for another. Impotence due to psychical disturbances is not infrequent, and also double undescended testicle, bilateral tuberculosis of the epididymis, gummata and prolonged exposure to x-ray. Extensive inflammatory lesions of the prostate gland may block the ejaculatory ducts, or so much pus may be poured into the seminal fluid that the spermatozoa are killed. Bilateral orchitis due to mumps, and bilateral epididymitis due to gonorrhœa are by far the most frequent of all causes.

Gonorrhœal epididymitis never affects the testicle; the globus minor bears the brunt of the attack, and the healing process leads to the formation of scar tissue which causes an occlusion of the efferent ducts of the epididymis and this prevents the egress of the normal spermatozoa. But it is known that the globus major remains patent, and here the efferent ducts are numerous, hence the idea was conceived of an anastomosis between the globus major and the vas deferens. The tunica vaginalis is opened and the globus major opened at a point rich in tubules. The fluid is at once examined for spermatozoa and if none are found a new site is selected. The vas is opened and its patency demonstrated by passing a fine tear-duct probe. A lateral anastomosis is carried out and the only successful operations were those in which silver wire was used as suture material. The first suture is placed at the distal end of the incision in the vas and in the lower end of the incision in the epididymis, taking a good bite. Two lateral sutures are then placed to take a good bite in the epididymis and include some of the cut tubules. A third suture is placed at the upper angle, taking care not occlude the lumen of the vas. A failure at one time is no contraindication to second operation if live spermatozoa are present and the vas patulous, but it should not be done under one year, as some successes did not manifest themselves for nine months. The operation is always done on both sides. In one instance the epididymis on one side showed no sperm, while on the opposite side there was a small spermatocele. An anastomosis between the spermatocele and the vas gave sperm in six weeks and in less than one year childbirth was achieved. In 31 suitable operative cases 19 were cured. Twelve of these begat from one to six children and in one case impregnation was followed by miscarriage. The operation is best carried out under general anæsthesia.

N. E. BERRY

OPHTHALMOLOGY

Cycloplegia. From an Editorial by Edward Jackson, *Am. J. Ophth.*, 1930, **13**: 1008.

Paralysis of the ciliary muscle is paralysis, not paresis, of relaxation or a mid-contraction. It eliminates for a time the influence of muscle contraction and nerve control on the refraction of the crystalline lens and on the total refraction of the eye. The use of a cycloplegic drug can give valuable information when it produces paralysis. But when it merely disturbs the action of the ciliary muscle, leaving that action indefinite and uncertain, it gives no help in determining the ocular refraction, except that the wider pupil may allow recognition of aberration and irregular astigmatism, and give larger diffusion circles on the retina, which the patient may recognize more easily and positive-

ly. The uncertainty introduced by incomplete and ineffective action of a cycloplegic is the essential reason why a medical man, ignorant of ophthalmology, but authorized to use drugs in the eyes, should not instil the cycloplegic for an optometrist incapable of judging the effects produced by it. This is also the reason why it is better for the oculist to apply the drugs himself rather than intrust their instillation to a trained nurse, who cannot pass on the results of the application she has made.

Cycloplegia is not a labour-saving device that will insure accurate results such as are achieved by machines of appropriate design that turn out a finished product always up to a certain standard of accuracy. It can remove the most general and most important influence that alters the refraction of the eye and interferes with its accurate measurement—the variation in lens refraction. The effective use of a cycloplegic gives information about ocular refraction that can be obtained in no other way.

Some doctors and many nurses do not know how to instil an atropine solution so as to get full cycloplegia. To prescribe glasses for convergent squint, Jackson always applies the atropine himself; and, in general, he does not entrust it to a nurse when full cycloplegia is important. The pupil may be fully dilated and fixed, while the eye still retains one-half or more of its accommodation. The method of instilling a cycloplegic should be quite different from that of putting drops in the eye for conjunctivitis. Only the part of the cycloplegic absorbed through the cornea reaches the iris and ciliary muscle. What is taken in through the conjunctiva passes into the conjunctival vessels and lymph spaces, and is carried to other parts of the body without any effect on the intra-ocular muscles. One drop of the cycloplegic solution should be placed on the upper part of the cornea while the lids are held apart, allowing it to spread over the whole corneal surface without being diluted by tears or wiped away by the motions of the lids. Applied in this way the effect of a cycloplegic is very constant and reliable. For loose, hit and miss applications, gelatine discs or an oily solution of the alkaloid may be as good or better. Cycloplegia is a valuable resource when used as a help to a thorough examination of the eye.

S. HANFORD MCKEE

Bilateral Retinal Detachment Complicating Toxæmia of Pregnancy. Richardson, S., *J. Florida M. Ass.*, 1929, **16**: 266.

After reviewing the literature the author reports that in all cases, in addition to the detachment, there were present definite pathological changes, such as œdema, hæmorrhage and perivasculitis. His explanation of this complication of pregnancy is that the choriocapillaris secretes a serum which is identical with the serum which is part of the general anasarca. This accounts for the detachment of the retina.

He reports a case in a primapara who for eight and a half months had a normal pregnancy, when suddenly her blood pressure rose accompanied by general œdema. Her vision gradually diminished to counting fingers, when labour was induced and the patient was delivered of a normal baby. Examination the next day showed a large serous detachment below the disc in the right eye and above in the left. These had increased by the next day so that vision dropped to perception of light. A combined scleral trephine and choriodialysis of both eyes was done the same day under local anæsthesia. Details of the operation are given. The opening in the sclera was made as near over the apex of the detachment as possible. Post-operative care consisted in absolute rest and dehydration. On the fourth day the retinæ were reattached, and after three weeks in bed the patient left the hospital with a vision of 20/40 in each eye. Three months later the vision was 20/30 in each eye, and the fields of vision full.

S. HANFORD MCKEE

The Frequency of Sympathetic Ophthalmia. Theobald, G. D., *Am. J. Ophth.*, 1930, **13**: 597.

This consideration of the incidence of sympathetic ophthalmia is based on the clinical and pathological material of the Illinois Eye and Ear Infirmary over a period of twenty years, including 1,465 patients with a history of accidental penetrating injury, besides 7,444 cataract extractions, and 2,922 other intra-ocular operations. Of 23 eyes enucleated with a clinical diagnosis of sympathetic ophthalmia, in 11 the diagnosis was confirmed by the histological examination. The other enucleations are justified by the fact that there were no certain clinical means of deciding at an early stage whether they were dealing with sympathetic ophthalmia or with a less harmful infiltrating inflammation.

The article is illustrated by a series of tables and microphotographs, and is summarized as follows: (1) Our small statistics show the greatest frequency of sympathetic cases occurring in the first decade. There are four cases below the age of ten years, and only one case for each of the following decades. (2) These statistics show that sympathetic ophthalmia is actually much less frequent than the enucleations that are done for sympathetic, or for fear of sympathetic, ophthalmia. (3) Diagnosis can only be made histologically. For this purpose each eye must be sectioned serially, and at least every tenth section carefully examined.

S. HANFORD MCKEE

OTO-RHINO-LARYNGOLOGY

The Blood in the Various Anginas. Shea, J. J., *Arch. Otolaryn.* 1930, **12**: 366.

The author points out that there are four types of changes in the blood in these cases:—(1) polymorphonuclear leukocytosis, as in acute follicular tonsillitis; (2) mononuclear leukocytosis, as in infectious mononucleosis; (3) leukopenia with a decrease in granulocytes, as in agranulocytic angina; (4) leukocytosis with a relative hypogranulocytosis, as seen in a generalized Vincent infection.

Infectious mononucleosis is an acute febrile disease characterized by an angina with enlarged glands and a blood picture in which there is a marked leukocytosis even up to three or four hundred thousand. The toxin of the disease stimulates the hæmatopoietic system, the resulting new cell being a mononuclear leukocyte. The course of the disease is usually benign. There are two types of agranulocytic anginas, one that ends fatally and is most frequently seen in middle-aged women and another type that is only a complex and has a better prognosis. The unknown toxic factor which causes the malady paralyses the hæmatopoietic system, especially the bone marrow where the granular units are formed. There is an initial sore throat, but later other mucous membranes become involved. It progresses to a generalized infection, usually with a fatal ending. There is a marked leukopenia with a great reduction of granulocytes, the polymorphonuclear cells, and a relative increase in the lymphocytes.

The arsenical compounds sometimes depress the hæmatopoietic system and present a symptom complex resembling acute agranulocytic angina. The progress is more favourable. The treatment for the agranulocytic anginas is to replace the blood by transfusion and to stimulate the blood-forming tissues.

Vincent's angina when it excites a systemic response stimulates the hæmatopoietic system, with a resulting lymphocytic leukocytosis. The number of leukocytes may reach over 90 per cent. These patients may die if not properly and carefully treated.

W. J. McNALLY

Further Observations on Age Variations in Auditory Acuity. Bunch, C. C., *Arch. Otolaryn.*, 1931, **13**: 170.

In a previous paper the results of a study of the auditory acuity in 353 patients from Johns Hopkins Hospital were given. In this relatively normal group there was a distinct loss of acuity in each successive decade for tones above 513 double vibrations, but the averages of the thresholds for tones of lower pitch were fairly constant for all patients regardless of age.

In this paper the age variations in auditory acuity in a group of 468 patients are presented, together with a statistical analysis of the effects of arteriosclerosis, hypertension, chronic cardiac conditions, syphilis and various malignant conditions on auditory acuity.

It is to be noted that tones below 1,024 double vibrations are heard almost equally well in all decades by patients in whom the diagnosis included one or more of the five conditions studied. For tones of higher pitch there is a constant loss for each disease, increasing with advancing age and for tones of higher pitch. The curve in any particular disease does not indicate significantly better hearing. Patients in all decades for whom a definite clinical diagnosis of arteriosclerosis has been made do not show a greater loss than those for whom such a diagnosis was not made.

No one of these more or less generalized systemic conditions can be considered responsible for loss of auditory acuity with advancing years.

W. J. McNALLY

NEUROLOGY AND PSYCHIATRY

Convulsive Seizures, their Production and Control. Fay, T., *Am. J. Psychiatry*, 1931, **10**: 551.

In this paper Fay epitomizes views of which many have been presented by him and his co-workers in previous communications. He supports the theory that major convulsive attacks are occasioned by increase in the pressure exerted by the cerebro-spinal fluid, associated with body fluid imbalance, and asserts his belief that "a rational means of control of the major seizures is now possible through continued and careful balance of water metabolism of the body." The convulsion is regarded as a normal massive response to a sensory stimulus, quite comparable to a normal tendon reflex. Over-accumulation of fluid within the subarachnoid spaces, one gathers, is a principal factor in determining this massive response, but other things are taken into account. In fact, Fay summarizes "the cycle of events surrounding a convulsion" under 29 headings, and seemingly 19 of these events precede the seizure. "The character, source or origin of the sensory stimulus may be variable and need not concern us more than would the same factors concerned in a simple tendon reflex. Of most importance is the fact that a *major* convulsive seizure is possible only when general increase in subarachnoid fluid is present, under specifically applied conditions." And "the major convulsive seizure, including the stupor, vomiting and headache, can be

entirely eliminated from the cycle of events by control of the cerebrospinal fluid volume and pressure." Absolute control and balance of fluid intake, by limiting the accumulation of cerebrospinal fluid, relieves and eradicates grand mal. In severe chronic cases, however, organic disturbances may militate against sufficient control of fluids. An analogy with diabetes is presented: control of the seizures is possible on a strict fluid balance, but return of the attacks may be expected after indiscretion in diet and fluid. The period usually required to obtain a satisfactory balance in a cooperative patient is from three to six weeks.

According to Kinnier Wilson, heredity can account for only 16 to 20 per cent of all cases. In this group, Fay suggests that defects of the cerebrospinal fluid eliminating mechanism, such as the Pacchionian bodies and venous drainage channels (especially sigmoid, lateral and occipital sinuses, which show great anomalies in idiopathic cases) may prove to be the "hereditary factor". In the remaining 80 per cent Fay believes the condition is due to "damage in the subarachnoid cortical fluid pathways or the filter structures, (a) the Pacchionian bodies at the vertex, or (b) disturbance in venous return from the brain, including lesions situated between the skull and the heart, acquired during fetal life or after birth". The whole question of fluid elimination and retention in the body becomes most important in this light. The kidney function, and its variability; skin elimination and its deficiency under hyperpyrexia; the entire question regarding fluid intake, its rapidity of absorption into the blood compartment, and its rapidity of distribution into the interstitial compartment (of which the cerebrospinal fluid represents the largest single reservoir [Gamble]); the factors surrounding water storage; the glucose metabolism of the tissues are all registered in terms of cerebrospinal fluid production and overaccumulation and must be evaluated in terms of deficient filter and drainage mechanisms and the consequent effects in each case. Uræmia, eclampsia, and the acute infections of childhood frequently are associated with convulsive seizures and almost invariably with a hydrated state. The forcing of fluids on the patient by the practitioner to "combat the toxæmia" usually greatly enhances the disturbed water metabolism and storage rapidly inducing the factors most favourable to the production of a convulsive seizure."

In respect of treatment the best results are seemingly obtained when the total fluid intake is restricted to less than 20 ounces per day. "A careful balance of intake and output to within one to three ounces per day must be established by proper regulation of fluids and diet." "Where an acute hydration state is present, dehydration must be carried to its logical establishment by means of spinal drainage, intravenous hypertonic glucose solution, purgation with hypertonic saline, and strict fluid limitation. Only the fluid necessary to maintain circulatory and body functions should be permitted if control of prolonged and severe generalized convulsions it to be obtained."

W. H. HATTIE

The Diagnosis of the Psychoses of Young Adults. Skottowe, I., *J. Ment. Sc.*, 1930, **76**: 315, 696.

In this paper the author sets forth the opinion that the understanding of the psychoses of young adults is possible only when the individual case is viewed developmentally in all its aspects—physical, psychological and environmental. It has not been shown that a specific cause underlies these psychoses, nor is the pathology constant or specific, so they cannot be regarded as disease entities. Efforts being made to elucidate physical changes in relation to psychoses are unlikely to make mental symptoms intelligible. Any cause must operate on something, and that something is the living being, ever changing, dynamic. "It is therefore valid to speak of the causes of a psychosis and of that on which they operate as if they were forces. This being so, we may regard the phenomena which we call the symptoms of a psychosis as a resultant of these forces." Study of a single component, be it ever so minute, will not explain the resultant if other components are neglected. The nature of the subject in whom the psychosis develops must be known, and this is an individual matter, not only in respect of the mind but also in respect of the peculiarities of body-chemistry and constitution generally. So the explanation of symptoms must be different in every case. "We must form some concept of when each component came into relationship with the individual; the amount of energy behind it; and the direction towards which it will deflect the resultant."

Component etiological forces are (a) inherited and (b) environmental. It is important to know if the individual's endowment is such that there is a probability of some of his potentialities being abnormal. Environmental forces are developmental and precipitating. The development of intellectual and integrating functions corresponds with the development of the brain. Failure of development of, disease of, or injury to the brain usually interferes with the development of these functions, but it does not follow that disturbance of these functions or interference with their development implies some physical disturbance of the brain. Quite apart from brain lesions, such conditions as physical ill-health, accident or deformity can, by restricting activity, and in other ways, modify functional

development, and the same is to be said of example, scholastic education and the inculcation of religious beliefs. The action of these developmental forces upon the inherited forces, and the reaction of the latter, result in the formation of character or personality. "Instinctive energies have had to submit to the obstructions of convention, religious beliefs, superstitions; and as long as the balance between these things (*i.e.*, the integrative function) is maintained there is no psychosis. If, however, some greater obstruction occurs, or if the integrative functions break down, the resultant of these forces may be a psychosis."

Precipitating forces are of three kinds:— (1) external forces; (2) personal psychological forces; (3) personal physical forces. External forces, such as financial disaster, bereavement, etc., are very varied. Personal psychological forces are usually not plainly evident and must be carefully sought for. We have here to deal with the unconscious, with repression, conflict (which may be conscious), and even symbolization and phantasy, but with a much broader application than Freud allows. Personal physical forces are often of singularly great importance. Confusion is so constant an accompaniment of disease, injury or poisoning of the brain that its presence always indicates a detailed search for some major etiological force in the somatic field. Skottowe takes exception to the teaching that toxæmia is responsible for conditions not characterized by confusion, pointing out that the regular order of development of functions is: instinct and emotion; orientation and memory; inhibition of instinctive action; integration. If the neurological basis of these functions is attacked by toxæmia, they should suffer in inverse order—as they do in intoxication produced by alcohol and chloroform, dementia paralytica or poisoning by puerperal toxins. But in many psychoses profound emotional disturbances may exist, perhaps with delusions, without disorientation or loss of memory or impairment of integration. In such the hypothesis of toxæmia is untenable. Toxæmias so definite as those from teeth, tonsils and appendices may be readily cleared up and the general health may have every appearance of robustness, and yet the psychosis may persist, so that the etiological importance of toxæmia is questionable. On the other hand, there is promise in the studies of the endocrinologists. If, for instance, they can prove that the endocrine glands are the physical basis of energy they will go far towards clarifying our understanding of the psychoses.

In the study of the clinical picture attention should be directed towards the determination of: (a) the content of thought and mental trend (*e.g.*, what is patient thinking about, and do his thoughts tend to be self-condemnatory, or ambitious, or grudging, etc.); (b) the emotional state and its relationship to the content of thought and mental trend (are mood and thought content and mental trend in harmony?); (c) the state of the intellectual functions. Only after all such things are taken into account are we justified in attempting to label the psychosis. For descriptive purposes the following types may be recognized: (1) the schizophrenic psychoses, characterized by disintegration of psychic functions, particularly disharmony between mood and thought content; (2) the affective psychoses, characterized by excessive display of any emotion which is in harmony with the content of thought and most appropriate to the situation of the moment; (3) the paranoid psychoses, characterized by persistent hallucinations or delusions of a personal nature, occurring without disintegration of the psychic functions and in a setting of clear, unclouded consciousness; (4) the organic psychoses—that is, with either organic brain disease or other somatic disease, characterized by clouding of consciousness, delirium, amnesia, disorientation and other impairments of intellectual functions. It should not be supposed that there is a hard and fast distinction between these types. "In-between" types are common, such as schizophrenia with affective features, etc.

W. H. HATTIE

HYGIENE AND PUBLIC HEALTH

The Prevention of Tuberculosis. Cummins, S. L., *J. State M.*, 1931, **39**: 2, 83.

Apart from bovine infections, which require separate consideration, the problem of tuberculosis prevention can best be approached through concentration of effort on the tuberculosis families in our midst. Consideration is given to: (1) removal of infected persons from their homes; (2) removal of susceptible persons from infected homes; (3) protection of those exposed to home infection from the risk of developing tuberculosis. The first of these, important though it may be, cannot under existing circumstances be more than a partial measure; it may ameliorate, but cannot solve the problem. The second, as illustrated by the Grancher method and by the less drastic method of temporary removal of children to preventoria, open-air camps, etc., should be more generally practised, and more advantage should be taken of the opportunities for complete study of cases and more complete follow-up. With reference to the third: "The experiences of Papworth and Preston Hall demonstrate that, where the home conditions are good and medical supervision adequate, it is possible for children to grow up with their tuberculous parents without contracting tuber-

culosis." It is, of course, impossible to reproduce "Papworth" conditions in the homes of the very poor, but some approach to them is at least feasible. The lines along which progress may be made in this direction appear to be roughly as follows: (1) provision of extra nourishment; (2) provision of "shelters", where possible, to facilitate separation of children from "case" or "case" from children; (3) systematic reexamination of "contacts" at half-yearly intervals; and extended use of x-rays in this connection; (4) intradermal tuberculin tests, repeated at appropriate intervals during childhood; (5) careful instruction of parents and children as to risks and how to avoid them."

In respect of bovine tuberculosis: "One shocking feature which marks it out from the more formidable 'human' type of infection: *it might be entirely prevented if the proper measures were adequately applied.* Tuberculosis of the 'human' type is a deeply rooted social disease, propagated in the most sacred associations of family life, so that the mind turns away instinctively from some of the measures which it is necessary to advocate—the separation of mother and child, of parent from home, of bread-winner from his work! But the prevention of bovine infections involves none of these horrors; merely the provision of pasteurized milk!" Professor Cummins is an enthusiastic advocate of pasteurization. "From the point of view of the poor, there are only two kinds of milk—cheap milk and dear milk. From the point of view of the tuberculosis service, there are only two kinds of milk; safe milk and dangerous milk. What we ought to have is a cheap milk—so cheap that the poorest can buy it for their children—and a safe milk —so safe that its use shall be free from any risk of tuberculosis—and this problem—a national one—is capable of adjustment by the simple expedient of pasteurization, carried out by or for local authorities as a measure of public health. The measure itself is a simple one. Its efficient application is not so simple and, in fact, is known to involve many difficulties. It is the writer's opinion that these difficulties should be faced and overcome."

W. H. HATTIE

Coal Miners' Lung: a Radiographic Study of Certain Groups of Industrially Healthy South Wales Coal Miners. The King Edward VII Welsh National Memorial Association, *J. Ind. Hyg.*, 1931, **13**: 19.

It is generally held that coal miners are exempt from the fibrosis of the lungs which affects so frequently underground miners in hard rock, particularly tin, copper and gold miners. The records of the Registrar-General for England and Wales, as published decennially, always indicate a low mortality from phthisis among coal miners. However, even in this class of workmen, the mortality varies somewhat according to the locality of the mine. The Lancashire coal miners nearly always show a mortality from phthisis considerably higher than other coal miners, although lower than the general mortality for all occupied and retired males in England and Wales. The consistently low mortality from phthisis among coal miners has given rise to the belief that not only is coal dust innocuous but that it actually serves as a protection against the tubercle bacillus. This is a moot point.

The present study, undertaken by three selected teams of the Medical Staff of the Welsh National Memorial Association, was intended to furnish a basis from which to proceed in any subsequent investigation into the radiographic appearances in the chest diseases of coal miners. One team examined miners of steam coal; another, miners of semibituminous coal; and the third miners of anthracite coal.

Forty-eight apparently healthy hewers of steam coal, who had worked from 17 to 54 years underground, were examined clinically and by x-ray in the first group. The dust to which these men were exposed was largely carbonaceous, but a certain amount of stone dust (used to minimize explosions) was present. Twenty-six of the 48 showed abnormal x-ray findings, as follows: 2, slight arborization; 19, unusual mottling; 3, old pleurisy; 1, early tubercle; and 1, unclassified. In general, the older the employee and the longer underground, the more marked the changes. Eleven men, however, who had been underground more than 30 years showed no noticeable abnormalities.

The second group consisted of 41 men working underground in semibituminous coal. These men also were exposed to stone dust. The period of service underground varied from 14 to 49 years. Of these 2 were classified by x-ray as normal; 6, as showing more fibrosis than normal; 7, as showing more local fibrosis than usual; 4, showed commencing generalized fibrosis; 19, moderate generalized fibrosis; 2, well marked fibrosis; and 1, tuberculosis.

In the third group were 42 anthracite miners who had worked from 19 to 57 years. The vital capacities of the men in this group were taken by a spirometer. Most of the men had a lower vital capacity than normal for sedentary workers, and considerably lower than normal for vigorous individuals. The average vital capacity was 2.95 litres, as compared with 3.38 for sedentary workers and 3.96 for vigorous persons. Considering the active occupation of the men studied, it is evident that their vital capacities were considerably reduced.

The x-ray pictures were abnormal in 33 cases, all of which showed mottling.

Unpublished pathological observations on the lungs of coal miners carried out by the Tuberculosis Department of the Welsh National School of Medicine suggest that the lung opacities appearing as mottling in x-ray films are due to the development of lung fibrosis, and that this fibrosis is associated with an abnormal amount of silica in the lung ash and to the retention of excessive coal dust in the lung tissue.

FRANK G. PEDLEY

Symposium on Meningitis. French, M. R., Pickett, W. H., Neal, J. B., Wadsworth, A., Perry, J. C., Geiger, J. C., *Am. J. Pub. Health*, 1931, **21**: 130.

In this symposium French presents an epidemiological study of three years' experience at Milwaukee. Cases numbered 383, with 208 deaths. The disease was most prevalent during the months of March and April, and in the congested parts of the city. The largest number of cases was in the pre-school age group (1 to 5), and the fatality rate in this group was 40. All of the 15 cases in age-groups 41 to 45 and 46 to 50 proved fatal. In babies under one year, the case fatality was 84 per cent; in age-groups 51 to 55 and 56 to 60 it was over 80 per cent; and the lowest fatality rate (36 per cent) was in age-group 11 to 15. Males were attacked almost twice as often as females. The schools seemingly played no part in the spread of the infection, nor was the spread influenced by isolation and culturing of contacts. Known contacts were cultured, and carriers were isolated until two negative cultures were obtained. The longest period of isolation was twelve days. Hospital treatment gave more favourable results than home treatment, and the lowest fatality rate at all ages (37 per cent) was achieved at the municipal isolation hospital where cisternal puncture was practised as a routine without any untoward results.

Pickett discusses an epidemic at Saginaw, Michigan. Of 264 cases, 85 resulted fatally. All but 11 cases were hospitalized; 7 were fatal. Here, again, contacts were cultured; 14 per cent proved to be carriers and were isolated for periods up to 14 days, until two negative cultures were obtained. No cases were traced to other known cases or to a common source of infection. Secondary cases occurred in 2 instances only. Experience gained showed the importance of immediate hospitalization, the immediate use of serum, quarantine and multiple culturing of all cases, multiple culturing of close contacts only, and truthful publicity relative to the progress of the epidemic, the nature of the disease and the precautions to be taken.

Neal reports the experience of the meningitis division of the New York Department of Health. Symptomatology and diagnosis are discussed fully. Serum treatment is urged; the response of many patients to this treatment is spectacular and gratifying. If the spinal fluid is cloudy or hazy there is immediate resort to intraspinal administration of serum. The usual dose is 20 c.c., if that amount or more of fluid is withdrawn, while if larger amounts are obtained (up to 60 c.c. may be withdrawn safely if proper precautions are taken) the dose may be 30 or 40 c.c. Serum is not often given at more frequent intervals than 24 hours. In cases of average severity, 6 to 8 doses are required; sometimes 20 or more doses are needed, the treatment being continued until two successive fluids are free from the meningococcus. If there are signs of blocking there is recourse to ventricular or cisternal punctures, but conservatism is advised in this particular.

Wadsworth deals with serum therapy. Meningococcus meningitis results from contact with a case or a carrier, but only in susceptible persons. In American outbreaks during the past three years no particularly characteristic strain of the meningococcus has been recognized. Different strains vary widely in their virulence, agglutinability (especially when recently isolated), and antigenic action as immunizing agents. It is essential that serums for specific treatment be prepared by immunization with a limited number of strains which are most representative and most active antigenically. The highest degrees of potency and valency should be assured. The dosage for intraspinous administration depends largely on the amount of fluid withdrawn. Intravenous administration, during the earliest stages, may be helpful, but should only supplement and not supplant intraspinal administration.

Perry considers an epidemic on the Pacific coast in 1929, when the incidence rate was higher than in any previous year for a long period. In California there were 695 cases, with 381 deaths; in Washington, 221 cases with 70 deaths. Oregon did not show an increase over preceding years, but there was a marked increase in Arizona and Idaho. A large number of cases developed on ships bound to San Francisco from Oriental ports—126 cases among approximately 8,400 steerage passengers, showing the effect of crowding and contact. Perry believes that the high incidence in the Pacific coast and adjoining states was independent of the prevalence of the disease in the Orient and the infection on arriving vessels. He thinks rather that it was a cyclic increase in which the Orient shared.

W. H. HATTIE

The Amelioration of Atmospheric Pollution. Green, H. W., *Am. J. Pub. Health*, 1931, **21**: 3, 237.

Measurements made in Cleveland over a period of two years showed that materials deposited from the air averaged 119 tons per square mile monthly. In addition to collectable material large quantities of carbon monoxide, carbon dioxide, ammonia, chlorine, nitrous and nitric and sulphurous and sulphuric acids, sulphur dioxide and hydrogen sulphide were present in the air, were breathed by residents, and played a part in damaging buildings and corroding metal work. Smoke from factory and house chimneys is not the only factor concerned in the solid pollution of the atmosphere, although it is the only one which has had serious consideration in municipal sanitation. Nearly a quarter of the total deposit was found to be $Fe_2 O_3$, little or none of which originates in the combustion of coal. The dust from unpaved streets and areas, from the wear upon pavements, tires, etc., from the handling of stone, gravel and other building materials, from old buildings undergoing demolition, from repair or construction of buildings, streets, etc., should all be taken into account. The quantities of such dust in the air depend largely upon the standards of municipal cleanliness and the efficiency of city sanitation. The control of the production of carbon monoxide and carbon dioxide by automobiles is now receiving some attention. In controlling the smoke menace the most important measures are the "prevention of installation of improper equipment, improper types of stokers for the fuel to be used, undersized combustion chambers and stacks which will not produce sufficient draft for proper combustion."

W. H. HATTIE

RADIOLOGY

The Value of the Roentgenologic Examination in Pulmonary Tuberculosis. Sampson, H. L., and Brown, L., *Am. J. Roentgen.*, 1931, **25**: 209.

Drawing conclusions from the examination of 50,000 stereoscopic plates and films taken at the Trudeau Roentgen Laboratory during the last seventeen years, the authors make several interesting statements worthy of consideration by those interested in tuberculosis. They think they can "categorically say that in a surprisingly large number of cases definite changes characteristic of tuberculosis occur in the film long before definite evidence of abnormal physical signs can be detected." They warn us of the error of stating that these changes are pathognomonic. They also think that any patient who presents only peritruncal or indeed no changes upon the roentgenogram at the age of twenty-five has very slight chances of developing active pulmonary tuberculosis later in life. In an attempt to determine how soon tubercles appear on the film animal experiments have been undertaken. In the human being, it has occasionally been noted that lesions have been discovered on the film where a week previously they did not exist. In one instance, a focus manifested itself in forty-eight hours. The writers are striving to formulate a density equivalent for comparison of densities seen in tuberculosis, using aluminum and cardboard as controls.

Film interpretation will always remain a matter of personal equation or judgment, for while it is inadvisable to assume that tuberculosis or any other pulmonary disease has pathognomonic shadows, familiarity has taught us to make certain differentiations which are reliable. The incidence (in percentage) of the five cardinal diagnostic data in 1,367 cases diagnosed pulmonary tuberculosis from 1,478 consecutive cases in the Trudeau Sanatorium are as follows: tubercle bacilli, 61.5; râles, 68.5; roentgen ray, 99.0; hæmoptysis, 33.5; pleurisy, 12.0;

At Trudeau, no patient is admitted who has pulmonary cavities detectable by physical signs, yet 30 per cent of all cases admitted have cavities revealed by roentgenograms. The character of the disease, evolution, and healing are discussed, as is extrapulmonary tuberculosis.

A. S. KIRKLAND

The Roentgenologic Diagnosis of Bone Tumours. Geschickter, C. F., *Radiology*, 1931, **16**: 111.

The introduction to this most excellent article states the increased reliability of the roentgen diagnosis of bone tumours must depend on a more careful analysis of the roentgen examination of bone as a diagnostic instrument, and a more comprehensive knowledge of the separate neoplastic entities of bone. Information derived from the study of over 1,000 cases is herein organized upon the capacity of the roentgenogram to depict changes in the seven groups of findings listed below, depending upon:— (1) whether the individual affected is young or old; (2) whether the lesion is single or multiple; (3) whether the lesion is medullary or periosteal in origin; (4) whether the effect of the lesion is bone destruction or bone formation; (5) whether the site is in the shaft, metaphysis or epiphysis, and which bone is affected; (6) the configuration of the diseased area from which such data as the mode of origin and duration of the tumour may be deduced; (7) whether or not pathological fracture has occurred.

The discussion of the various forms of bone disease is exhaustive and a distinct addition to

reference literature of the subject. A reference graphic chart is included, as well as many excellent roentgenograms. The article is one which should be on every radiologist's desk. The bibliography is also extensive and of much value.

A. S. KIRKLAND

Obituaries

Dr. C. B. Biron, of Ste. Sophie de Levrard, died recently at Montreal, aged fifty-five years. He was born at St. Flore, Que., in 1875 and was educated at the Seminary of Three Rivers and at Laval University, Montreal, taking his medical degree at the latter institution in 1900. He was a governor of the College of Physicians and Surgeons of Quebec,

Dr. Michael Joseph Casserly, one of the associate Coroners for Toronto, and a widely known medical practitioner, died on April 3, 1931, at St. Joseph's Hospital, where he was taken about a month ago for treatment for an infection which developed from receiving a sliver in his leg.

Dr. Casserly, who was born in Tottenham, was a graduate of the University of Toronto in medicine (M.B., 1908). He served overseas with the Royal Army Medical Corps. His appointment to the staff of associate Coroners was made by the Ontario Government about three years ago, and since then he had been entrusted by Chief Coroner M. M. Crawford with many important investigations. Dr. Casserly was on the outdoor staff of St. Michael's Hospital, and was one of the medical inspectors for the Separate School Board.

Dr. Peter Gerald Douglass died at Halifax, on March 24, 1931. Dr. Douglass graduated at Dalhousie in 1925, and practised in Halifax from the time of his graduation. Before beginning medical studies he served overseas in the Army Medical Corps during the greater part of the war, when his familiarity with French and German brought him into much demand as an interpreter. His death, which followed a very short illness, was due to pneumonia.

Dr. S. S. Gibson, of Wolsley, Sask., died on February 27, 1931. The cause of death was arteriosclerosis. Dr. Gibson was a graduate of the University of Western Ontario (1892).

Dr. Wilmot Alvin Graham, of Weston, and formerly of Toronto, died on March 8, 1931, from pneumonia, after a brief illness. The son of Ex-Alderman R. H. Graham, he was born in Toronto in 1881, and had practically spent his life in that city. Following his graduation from the University of Toronto (1903), Dr. Graham pursued post-graduate work in Edinburgh, Scotland. He had the distinction of being one of the first doctors to be appointed to medical inspection of the public schools of Toronto. For some time he had been retired from active practice because of ill health.

Surviving are his widow; his father; one sister, Mrs. Alex. Leitch; and three brothers, F. W. Graham of the City Commissioner's Department, W. C. Graham of Barrie, and H. A. Graham of Toronto.

Dr. Arthur Hamilton Hough, formerly of the Canadian Army Medical Corps, died on March 7, 1931, at Wiarton, Ont. He was a graduate of Trinity University (1891).

Marshall Edgeworth Gowland, M.A., M.B., of Milton, Ont., died in Hamilton General Hospital on April 8, 1931. He was a graduate of Toronto University (M.B., 1905). Dr. Gowland served two years as a member of Milton Town Council, and at the time of his death was Medical Officer of Health for the town and jail surgeon. He was a member of the Milton High School Board for several years, President of the Halton Medical Association, and was a supporter of all sporting organizations. He was a member of St. Clair Lodge, A. F. and A. M., No. 135, G.R.C., Milton. Surviving are his widow and three sons, Marshall, Gordon and Douglas, all at home.

Dr. Charles Joseph Laird, of Southampton, Ont., died in the Owen Sound General Hospital on April 9, 1931. Dr. Laird had been practising his profession in this district for thirty-seven years and the hard work during the past winter wore him out and finally he developed pneumonia, from which he did not recover. Dr. Laird held the M.B. degree of Toronto University (1893), and also the M.D., C.M., of Trinity University (1893). He was well known in the district and a Conservative in politics, having been treasurer of the Conservative Association of North Bruce for many years. While he was never anxious for political office his name has repeatedly been before the Conservative nomination committee. He is survived by his widow and three brothers, Dr. W. Laird, R. I. Laird and H. W. Laird of Guelph, and two sisters, Mrs. Fasken of Guelph, and Mrs. J. Coutes of Belgrave, Ont.

Dr. Hugh McIntyre, a native of North Yarmouth, who graduated from the Medical School of the University of Western Ontario in 1891, died in Buffalo on March 18, 1931, after a week's illness from influenza. Dr. McIntyre had practised in Buffalo virtually the entire period since his graduation, and was one of the city's leading physicians. He was born in Yarmouth Township, northeast of St. Thomas, 75 years ago. His widow; a son, Hugh T. McIntyre, Buffalo; and three sisters, Mrs. A. E. Bucke, Misses Julia and Christie McIntyre, all of Yarmouth Township, survive.

Dr. Victor H. McWilliams, of Toronto, died, after a brief illness, in Grace Hospital on March 29, 1931. He was born in Peterborough fifty-four years ago, and was educated in that city and at the University of Toronto (M.B. 1900).

Dr. McWilliams had a splendid record of war service, and at the outset of hostilities joined the Royal Army Medical Corps, and served with it in Egypt and France. He later returned to Canada, and was attached to the C.A.M.C. at Camp Borden, and recently was Adjutant at the Base Hospital, Gerrard Street East.

In 1919 he again joined the R.A.M.C., and went to Siberia with the British Expeditionary Force, and on his return became a District Medical Officer in the Department of Health. During his army service he was a great friend to the boys in the ranks.

Dr. McWilliams was widely known in sport circles, and was a member of the Rosedale Golf Club, and was one of the original members of the Granite Club. He was an ardent bowler and curler. In his early days he played lacrosse with Peterborough and hockey with Varsity.

He is survived by his widow, Josephine Sheppard McWilliams; his mother, Mrs. J. B. McWilliams; a brother, Theodore; and a sister, Mrs. J. B. Miller, all of Peterborough; and another brother, R. F. McWilliams, of Winnipeg.

Dr. Robert Morrow, of Guelph, died on March 9, 1931, at the age of ninety-three. Until two weeks before, when illness overtook him, he was still following his profession, and while for some years he had not been a general practitioner he had patients from coast to coast.

A son of the late Mr. and Mrs. Hugh Morrow, of Peel County, he graduated from Victoria University in 1864, and after some years' association with Dr. Dellingbough, of Buffalo, during which time he toured Canada and the United States, he commenced to practise in Acton in the late "sixties". He came to Guelph in 1880, and practised continuously there until he became ill. He was active in his profession for 67 years, spending over half a century of that time in Guelph. In 1872 he was married to Miss Joanna Tyson, of Guelph, who survives with one daughter, Margaret. There are also two brothers, Hugh, of Brampton, and George, of Fergus.

Dr. Albert Mitchell Perrin, for many years an outstanding practitioner of Yarmouth, N.S., died after a long illness on April 1, 1931. He was a graduate of the University of New York (1873), and the greater part of his professional career was spent at Yarmouth, where he represented the United States Public Health Service for a long period. A crippling nervous condition compelled his retirement several years ago, but his interest in medical and other affairs did not flag, and until within a short time of his death he delighted visitors with graphic accounts of experiences in his early days in practice.

Dr. Arthur Douglas Proctor, died on March 16, 1931, after an illness of six weeks, in his fifty-first year. Dr. Proctor was a graduate of the University of Toronto of the class of 1903. He was of United Empire Loyalist stock, and was a son of the late Josiah and Mrs. Proctor, of Sidney Township. His wife, Flora Castellanos, who was a resident of New York City, died some years ago. A prominent yachtsman, Dr. Proctor was a member of the Bay of Quinte Club. Soon after his graduation he filled a post in Venezuela, where he remained one year. During the war he was in charge of Freeport Sanitarium, where veterans were treated for lung conditions. In 1926-27 he served as alderman of the city, while he also held other civic positions. He leaves one daughter, Cecilia, a student at the local collegiate institute, and one brother, Frank Proctor, City Solicitor of Ottawa.

Dr. John William Frederick Purvis, one of Brockville's leading physicians, expired suddenly in his office on March 16, 1931, from cardiac failure before medical assistance could reach him. He had been suffering periodical heart attacks for some time, but was engaged in his practice as usual. Dr. Purvis was born in the village of Lyn in 1870. He graduated from Bishop's College Medical School, located in Montreal, in 1896, and practised his profession in Athens, Leeds County, before coming to Brockville, nineteen years ago. Surviving are his widow, formerly Miss Edna Rolston, Metcalfe, Ont., and three sisters, Misses Evelyn, Henrietta and Winnifred Purvis, all of Brockville.

Dr. Edward John Semple died at his residence, Westmount, Que., on April 20, 1931.

Dr. Semple was born in Montreal, the son of the late John Henry Semple and Isabella Eleanor Murray. He received his early education at St. Mary's College and took his B.A. degree from Fordham University. In 1893 he graduated in medicine at McGill with honours and took up post-graduate work in London, England. On his return he specialized in children's diseases and later as a consultant on the heart. In 1906 he was associated with the late Dr. J. G. Adami, Professor of Pathology at McGill as demonstrator in the pathological department.

A pioneer welfare worker among children in Montreal, Dr. Semple was in charge of the milk station of the Iverley Settlement and served as a doctor on its board. He was attached to the staff of the Western Hospital from 1917 to 1924.

In 1927 he was forced by ill-health to withdraw from hospital work. He spent several months in the south of France in an effort to regain his strength but found on his return to Montreal that he had to relinquish all his work.

He is survived by his wife, formerly Helen F. Phelan; by two brothers, Recorder Semple and H. S. Semple; and by one sister, Miss Stella Semple, all of Montreal.

News Items

British Empire

The Second Garton Prize and Medal.—This prize and medal has been instituted by the Grand Council of the British Empire Cancer Campaign with the object of promoting investigations into the nature, causes, prevention and treatment of cancer. A medal (suitably inscribed and engraved with the seal and motto of the Campaign), together with an honorarium of £500, will be awarded to the person, or group of persons who shall submit the essay embodying the results of original investigations which, in the opinion of the Judges, appointed by the Grand Council of the British Empire Cancer Campaign, is the best contribution towards "The biological effects and mode of action of radiations upon malignant and other cells."

In the event of several dissertations of sufficient merit being submitted, the prize may be divided, or additional awards made.

The prize will be reserved if, in the opinion of the Council, no dissertation of sufficient merit be received.

Candidates, who may be of either sex, must be *British subjects domiciled in the British Empire* and not at the time members of the Grand Council of the British Empire Cancer Campaign.

The honorarium may be awarded either to an individual or to a group of persons who jointly submit a dissertation.

The dissertations shall be printed or typewritten in English, and embody the results of original investigations carried out, either wholly or in part, during the three years immediately preceding the year in which the prize shall be awarded.

The dissertations shall not bear the name of the author or authors, but shall be distinguished by a motto or device, and be accompanied by a sealed envelope containing the name and address of the author, and having on the outside the motto or device corresponding with that on the dissertation.

The dissertations shall be addressed to the Honorary Secretary, British Empire Cancer Campaign, 12 Grosvenor Crescent, Hyde Park Corner, London, S.W.1, and be delivered not later than December 31, 1933.

The prize dissertation (with all accompanying illustrations and preparations) shall become the property of the British Empire Cancer Campaign, and shall be published at their discretion under the name of the author or authors.

Dissertations not approved for a prize shall, upon authenticated application within three years of the award on the specified subject, be returned together with the unopened envelopes containing the names and addresses of the authors.

The award of the Second Garton Prize and Medal will be made early in 1934.

The Campaign expresses the hope that a number of essays will be submitted from Canada.

The First Garton Prize and Medal terminates December 31, 1931.

[In view of the unrest in India, and the publicity that has been given to the matter of "passive resistance", the following "appeal" requires no special comment. It tells its own story.—ED.]

Boycott British Medicines.—(1) The Joint-Boycott Committee appointed by the Bombay Medical Union and the Bombay Chemists earnestly requests all chemists and druggists throughout India to solemnly declare that henceforth they will not import, order or undertake to supply their customers with drugs, chemicals, patent medicines, appliances, instruments or any other goods of British manufacture, and that they will boycott all breakers of this solemn declaration. (2) The Joint-Boycott Committee appointed by the Bombay Medical Union and the Bombay Chemists begs to draw your attention to the foregoing solemn declaration made by the chemists and requests earnest cooperation of the public and the doctors, which alone would enable the chemists to implement the said declaration, and through such willing cooperation we shall jointly be able to encourage indigenous industries, drugs, chemicals, hospital cotton and dressing, instruments, etc., of Indian manufacture. We have therefore to ask you not to order any drugs, etc., of British manufacture henceforth, and where Indian substitutes are not available, to order non-British substitutes for the British. (3) For the guidance of the doctors and the chemists the Joint-Boycott Committee is preparing a complete list of available Indian substitutes, and where such are not available non-British substitutes for British drugs, dressings, appliances, instruments, etc., a copy of same will be supplied to you in due course. Thus we desire to cooperate with you and expect in return your cordial cooperation, for the progress and prosperity of Mother-Hind.

Great Britain

The Ninety-ninth Annual Meeting, British Medical Association.—The ninety-ninth annual meeting of the British Medical Association will be held at Eastbourne this summer under the presidency of Dr. W. G. Willoughby, medical officer of health for Eastbourne, who will deliver his address to the Association on the afternoon of Tuesday, July 21st. The sectional meetings for scientific and clinical work will be held, as usual, on the three following days, the morning sessions being given up to discussions and the reading of papers, and the afternoons to demonstrations. The annual representative meeting, for the transaction of medico-political business, will begin on the previous Friday, July 17th.

Centenary of the British Medical Association.—Arrangements are now being made to celebrate the hundred anniversary of the British Medical Association at its annual meeting in London in 1932. Lord Dawson has accepted the presidency and a large attendance of members and guests from overseas is expected. Outstanding events of the meeting will be a pilgrimage to Worcester, where the Association was founded, and the unveiling of a memorial to Sir Charles Hastings on July 24th. The president will give his address in the Queen's Hall on the 26th, and this will be followed by a reception in the Albert Hall, where there will be accommodation for 5,000 or 6,000. The centenary dinner will be in the same place, and arrangements are being made for 2,000 diners. The scientific sections are meeting in the South Kensington buildings of the University of London from July 27th to 29th, and it is hoped that the contributors will be widely representative of medicine at home and abroad. The honorary organizing secretaries of the centenary meeting are Dr. E. A. Worley and Dr. H. Gardiner-Hill.

The British Pædiatric Association.—The annual meeting of this Association will be held at Malvern on June 12th and 13th. Canadian pædiatricians will be cordially welcomed.

Royal College of Physicians.—At a meeting of the Royal College of Physicians of London on March 30th, Lord Dawson of Penn was elected President, in succession to Sir John Rose Bradford.

Post-graduate Courses in Medicine at the University of Edinburgh.—Post-graduate teaching in the Edinburgh Medical School was first organized in 1905-06, when the University and the School of Medicine of the Royal Colleges agreed to act conjointly, and thus to make available for graduates all the resources of the Edinburgh school.

Commencing in 1906, post-graduate courses were given annually until the outbreak of war. They were again resumed after the cessation of hostilities, and with each succeeding year greater facilities for post-graduate study and instruction have become available.

The following is an outline of the arrangements for 1931, but facilities for study can usually be arranged to suit individual requirements, provided due notice is given in advance. Graduates who may desire to study in Edinburgh at times other than arranged for in this syllabus, or who wish instruction in any special branches of medicine or surgery, are invited to communicate with the Honorary Secretary.

Application for enrolment should be made to the Secretary, Post-Graduate Courses in Medicine, University New Buildings, Edinburgh. Places will be reserved only if applications are accompanied by the fees. In the event of there not being sufficient entries for any course, this course may not be held. Entries should be sent in at least fourteen days before the course starts.

The following courses are announced: Obstetrics, Gynæcology and Pædiatrics, July 13-August 8. A General Practitioner's Course, August 10-September 5. A General Surgical Course, August 10-September 5. Besides these Special Lectures and Clinical Discussions have been arranged for.

The fees are 10 guineas for four weeks, and 6 guineas for two weeks. Special classes range from 2 to 10 guineas.

An Insulin Inquiry.—The Medical Research Council are plainly concerned over the failure of the medical profession to use insulin to full advantage in treating diabetes. Hence there is to be an inquiry into the results of insulin treatment to discover more precisely how successful it has been under the best conditions. Apparently the death-rate from diabetes has made some practitioners sceptical about the value of insulin, though the Council declare it is no longer open to challenge, and the chief hospital centres have no doubt at all about its success as a life-saver.

The increase in the death-rate from diabetes is due to a high mortality among elderly sufferers who are not so often treated with insulin. Deaths during early and middle life have been substantially reduced, and the Research Council state quite bluntly that the saving of life could be greater still if all patients needing insulin were being given it. There can be no complaint about supply or cost, and insulin has been made available for panel patients.—*Yorkshire Post*, March 4, 1931.

Vaccination.—Replying to Mr. Carter on February 26th, Mr. Greenwood said that he had the whole subject of vaccination under consideration, but could not in present circumstances undertake to introduce legislation suspending the compulsory clauses of the Vaccination Acts, as suggested. The compulsory requirements of the Vaccination Acts were in effect

limited to infants under 12 months of age, and in this class the occurrence of post-vaccinal encephalitis had been practically negligible. In Holland a compulsory measure had been suspended, but it related to the vaccination of children at school age. He added that since January 1, 1930, a total of 7 cases of post-vaccinal encephalitis had been reported, 2 of which had proved fatal.

Henry Hill Hickman.—The Wellcome Historical Medical Museum, 54 Wigmore St., London, W.1, has put out a commemorative volume, 1830-1930, which contains much interesting information about Dr. Henry Hill Hickman, who was the pioneer in advocating a method of anæsthesia in surgical operations. Dr. Hickman died at the early age of twenty-nine. After failing to interest English surgeons, he endeavoured to have his method adopted in Paris, without success. The volume contains some finely executed plates and reproductions, and is a fitting tribute to its subject.

Red Cross Day.—May 12th, the anniversary of Florence Nightingale's birthday, is to be celebrated this year as Red Cross Day throughout the Empire. In London the County of London branch of the British Red Cross Society will lay a wreath on the Florence Nightingale memorial in Lower Regent Street. In Hampshire the county branch is organizing a pilgrimage to Florence Nightingale's grave in the little churchyard near Embley. Other county branches throughout the country are arranging their own ways of illustrating the work they are carrying on. In London a Red Cross flag day is to be held on May 14th, and on May 16th there is to be a big parade of V.A.D. detachments at the Duke of York's headquarters, Chelsea, at which H.R.H. Princess Mary, Countess of Harewood, will present colours to the County of London branch of the society. Notifications have already been received at the headquarters of the society that Red Cross Day is to be observed widely throughout the Empire. In Canada, Australia, and South Africa preparations for its observance are now in progress.

Alberta

During the session of the Provincial Legislature which ended on March 28th, items of interest pertaining to public health and hospitals were made known. The total estimates for the Department of Health for 1931-1932 amount to $1,600,000.00, which is about $10,000.00 more than for 1930-1931 and $100,000.00 more than was spent in 1929-1930. The University Hospital at Edmonton obtained the customary grant of $20,000.00, in addition to the regular amount of fifty cents allowed for each patient per diem which is also given to every public hospital in the province for poor patients. Patients are frequently sent to the University Hospital for diagnosis of their disease and are treated if they wish to remain, and the municipality from which each comes has to pay the necessary cost.

The total expenditure for the administration of the provincial mental hospitals is large. The estimates for 1931-1932 are: Ponoka Mental Hospital $431,000.00; Oliver Mental Institute $130,000.00; Red Deer Training School $79,000.00; a total of $640,000.00, which is close to one dollar per head for the whole population.

The Provincial Sanatorium for tuberculous patients near Calgary will have expenditures of $215,000.00 for 1931-1932. There is a great need for double the present accommodation. The waiting list is always a large one, and it is unfortunate that so many have to do without proper care and treatment owing to the present situation.

The per capita grant to Alberta hospitals, on the basis of fifty cents per hospital day, amounts to $404,000.00, which is less than the amount paid in 1929-1930 and 30,000.00 dollars less than the estimate for 1930-1931. About 20 per cent of the expenditure is for the cost of administration and for preventive medicine. A strange anomaly exists in Alberta, as in other provinces. The government engages at its own expense a lawyer to defend a criminal, providing the accused is unable to meet the cost himself. When it comes to a reputable citizen, whose only offense is that he is short of money and is unable to pay for his medical care, the government will protect him by allowing a certain amount for his hospital dues, but the government makes no provision for the physician's fee if the municipality on which the government has placed the burden refuses to assume any responsibility.

The Mental Diseases Act has been amended to provide for the establishment of psychopathic wards in various centres in the province. These will be under the supervision of a physician appointed by the provincial government, who will be Commissioner of Mental Health. A patient will be admitted to these wards either by voluntary application, or by a warrant issued by the attorney-general, or by the certificates of two physicians. He may also be admitted if a physician certifies that he requires treatment, and he can be placed in hospital without resort to methods of deception, restraint or violence. Once admitted, he must remain until properly discharged. The patient may be permitted to be absent on trial at the option of his physician. This does not permit a person to have his freedom if he is held in custody on a criminal charge.

During the months of January and February expenditures for the Calgary Municipal Hospitals totalled $47,447.00. During the same months of 1930 the total was $52,886.00. This year accounts collectable were $25,703.00 compared with $29,421.00 during January and February of 1930. This left the charge to the mil-rate at 21.744, while for the first two months of last year it totalled $23,404.00. Revenue account at the General Hospital brought in $16,465.00 during January and February of this year and $18,396.00 during the same months last year. There was a loss of $901.00 following the motion of the City Council to make free the use of the Isolation Hospital.

Government grants during January and February were $5,045.00 for the General Hospital and $314.00 for the Isolation Hospital. Expenditure for salaries was $25,625.00 for the first two months, compared with $26,442.00 for the same period in 1930.

Some of the municipal hospitals in the "dried-out" areas of the province are financially embarrassed, since the taxes levied have not been collected. They may have to close their doors.

The usual number of applications for registration with the College of Physicians and Surgeons of Alberta has been received. The council is closely examining these, and recently refused two applications from physicians whose records elsewhere were not good. Those desiring to register must understand that they cannot leave a bad record where they have been registered and obtain first-class standing in Alberta.

At a recent meeting of the Edmonton Academy of Medicine, Dr. R. B. Mooney was elected *President* and Dr. H. K. Graff, *Secretary*.

Dr. W. S. Galbraith was elected *President* and Dr. J. K. Bigelord, *Secretary* of the Lethbridge Medical Society.

Dr. S. F. McEwen was elected *President* and Dr. B. C. Armstrong, *Secretary* of the Medicine Hat Medical Society.

Dr. R. M. Reid was elected *President* and Dr. A. Couillard, *Secretary* of the Vegreville Medical Society.

Both Dr. Harold W. McGill, M.C., M.L.A., of Calgary, and Dr. W. A. Atkinson, M.L.A., of Edmonton, did good work during the session of the legislature recently ended.

At the annual meeting of the Calgary Medical Society the following officers were elected for 1931-1932: *President*, Dr. W. H. McFarlane; *Vice-President*, Dr. A. Fettes; *Secretary*, Dr. W. H. McGuffin; *Treasurer*, Dr. H. N. Jennings; *Executive Committee*, Drs. H. A. Gibson, E. P. Scarlett and A. H. McLaren.

G. E. LEARMONTH

British Columbia

The Fraser Valley Medical Society held a dinner on March 24th, in honour of Dr. George E. Drew, of New Westminster, to commemorate his fiftieth year in the practice of medicine. Graduating in New York in 1881, Dr. Drew can recall the coming of antiseptics. Speaking of those early days, the Doctor recalled a surgeon, wearing a rose in the buttonhole of his frock coat, who made no other preparation for a major operation than to roll up the sleeves of his coat. In an address that held his listeners' close attention, he told of the interest aroused by the first announcement of Pasteur's discoveries, of the carbolic spray, and of Lord Lister, whom he knew personally. After practising in Nova Scotia for thirteen years, Dr. Drew, in 1894, came west to British Columbia, and took up his residence in New Westminster. The dinner was attended by some thirty medical men, and served to emphasize the universal esteem and affection in which Dr. Drew is held.

At the recent session of the Legislature, two bills, one to legalize the work of chiropractors, the other to license drugless healers, were withdrawn, when Premier Tolmie announced that the government will shortly appoint a commission to investigate the whole matter. It is of interest that, while this has been greeted with general satisfaction, the representatives of the cults concerned have not been welcoming the news.

The Vancouver branch of the Association of Medical Services of Canada held a dinner on March 17th, at the mess of the 18th Field Ambulance. Some thirty medical officers attended, including Col. Lorne Drum, C.B.E., D.M.O., of this military district.

Dr. R. E. McKechnie, who has been seriously ill, has, to the delight of his friends, recovered, and was able, on March 17th, to deliver the Osler oration, before the Vancouver Medical Association.

C. H. BASTIN

Manitoba

On March 27th, Mr. Robt. England, Manager of the Department of Colonization and Immigration of the Canadian National Railways, gave an interesting address before the Medical Arts Club of Winnipeg. Mr. England, who was introduced by Dr. W. Harvey Smith, spoke of the various colonies of European peoples in the Canadian west. He stressed the importance of developing the attitude of mutual helpfulness and understanding.

Dr. D. A. Stewart, Superintendent of Ninette Sanatorium, gave the Lister Day Address before the faculty and students of Manitoba Medical College on April 4th. Dr. B. J. Brandson, Professor of Surgery, acted as Chairman.

The Manitoba Medical Association and the Winnipeg Medical Society have gone on record as being in favour of 100 per cent pasteurization of the milk consumed in the City of Winnipeg; provided that all producers of milk shipping to the city for pasteurization come under regulations now governing raw milk producers in reference to tuberculin testing of cattle, sanitation of premises and cleanliness of handling and shipping milk; that the new regulations regarding control of pasteurization plants, as passed by the Provincial Board of Health are enforced, and that consideration is given to the provision of pasteurization facilities at a reasonable rate for the small dairyman. The movement for 100 per cent pasteurization of Winnipeg milk is being heartily supported by the Young Men's Section of the Winnipeg Board of Trade.

Drs. A. M. Goodwin and A. V. Sykes, of Winnipeg, have been added to the medical staff of St. Boniface Hospital in the Department of Obstetrics, and Dr. G. H. Shapera in the Department of Pædiatrics.

The Gordon Bell Memorial lecture was given in Lecture Theatre A of the University of Manitoba on April 24th by Hon. E. W. Montgomery, Minister of Public Health. The speaker, who was an intimate friend of Dr. Bell, spoke of the qualities that made him a leader of medicine for a quarter of a century in Manitoba.

Dr. P. A. MacDonald, director of the radium emanation plant of the Manitoba Research institution, has been awarded the research prize of $250.00 given by the Scientific Club of Winnipeg.

The second of a series of twilight talks was given to the Medical Arts Club on April 17th by Dr. H. J. Merkeley, the President of the Winnipeg Civic Progress Association. His subject was "Civic problems and finances."

The regular monthly meeting of the Winnipeg Medical Society was held on April 17th in the Physiology Lecture Theatre of the Medical College. Dr. J. D. MacEachern spoke on "Common factors influencing surgical mortality," and Dr. C. M. Clare spoke on "Alternating squint."

ROSS MITCHELL

New Brunswick

Under the extra-mural scheme of lectures, Dr. L. H. McKim, of the Montreal General Hospital, addressed meetings in the past month, at Saint John and Moncton while on his way to Halifax. Dr. McKim discussed "Fractures of the upper arm" and his discourse, as usual, met with the greatest favour. A subject as practical as the treatment of fractures is always of interest to the greatest number of practitioners and when such a subject is handled by an authority like Dr. McKim, the advantage to listeners is more than doubled.

It appears to the writer and a great number of those whose opinions have been expressed that the one-man tour is a decided success. The same opinion was expressed previously when Dr. Penfield, of Montreal, appeared before us.

At a special meeting of the Fredericton City Council. it was suggested that the erection of a new nurses' home for the Victoria Hospital was a necessity. The estimated cost for this home would be $50,000.00. If the new nurses' home is erected, the present nurses' home would

be available as additional accommodation for cases requiring isolation.

Dr. J. V. Anglin, Medical Superintendent of the Provincial Hospital for Nervous Diseases at Lancaster, presented the 83rd annual report to the Legislature on March 6th. It showed that the number of patients retained in the institution on the first day of the hospital year was 782. During the year 213 were admitted. Patients discharged were 101. There were 69 deaths, and at the end of the year there were 823 remaining in the hospital for treatment. Since the hospital opened to receive patients 11,068 had been admitted. An interesting feature is that the previous environment of the majority was rural.

The new Hospital Act presented at the present session of the Legislature was withdrawn by the Committee, to be presented again at a subsequent session.

Dr. H. A. Farris, who has spent the past year doing post-graduate work in London and Vienna, has resumed his practice in Saint John where he will confine his consultations to heart and pulmonary conditions.

Dr. G. A. B. Addy, of Saint John, has returned from his trip to the West Indies.

Dr. Laughlin MacPherson has returned to his duties at the Saint John County Hospital following a severe attack of typhoid.

Dr. E. M. Busby, for some time past an interne at the Saint John County Hospital, has resigned to go into practice in the Province of Quebec.

A. STANLEY KIRKLAND

Nova Scotia

The trustees of the Glace Bay General Hospital have been authorized to borrow $75,000.00 for the erection of a nurses' residence and the installation of a new x-ray plant.

A rearrangement, which includes the adaptation of the section hitherto used for infectious cases, is to add twenty-five beds for general purposes at the Aberdeen Hospital, New Glasgow. A number of other important improvements are to be made.

Dr. L. H. McKim, of Montreal, was a recent visitor to the maritime provinces, as a lecturer under the Canadian Medical Association scheme for post-graduate instruction. He addressed the Halifax Society on March 25th, when he discussed fractures involving the ankle joint in his usual able and acceptable manner.

According to the report presented to the provincial legislature, the Nova Scotia Training School (for feeble-minded children) has made substantial progress in its building program. There have now been erected a dormitory to accommodate 50 boys, a dormitory to accommodate 70 girls, a trades and school building, staff houses, a laundry and bakery, and necessary farm buildings.

In his last annual report, recently submitted to the provincial legislature, Dr. F. E. Lawlor, Medical Superintendent of the Nova Scotia Hospital, records the largest number of admissions for any year since the opening of the hospital seventy-three years ago. The recovery rate, based on admissions, was 39 per cent. Malarial treatment for general paresis is yielding results comparable to those being obtained from this treatment in other institutions for the insane.

Dr. H. L. Scammell has been appointed senior medical assistant to the Superintendent of the Victoria General Hospital. Dr. Scammell has already had administrative experience on the staff of the hospital, following which he accepted an appointment with the American College of Surgeons which involved the inspection of hospitals from coast to coast. He returns to Halifax not only with a very extensive knowledge of hospital affairs but also with such a reputation for tact, discernment and executive ability that success in his new position would seem to be assured.

On the occasion of the graduation of a class of nurses from the Grace Maternity Hospital, on March 12th, Dr. P. A. Macdonald, on behalf of the medical staff, reported the busiest year in the history of the hospital. A maternal mortality rate of 2 per cent had to be admitted, but two-thirds of the deaths were in women who were practically moribund on arrival at the hospital. Dr. H. B. Atlee addressed the graduates, urging them to do their share in the prevention of the pain and danger now incident to parturition by emphasizing the importance of attention to the physical development of all female children from earliest infancy.

During the last fiscal year, according to the report of the late Mr. W. W. Kenney, 5,147 patients were treated in the wards of the Victoria General Hospital. The average number of days in hospital per patient was 15.44; the average occupancy of public beds, 83 per cent, and of private beds, 79 per cent; the average daily cost per patient, $3.99. Nearly 11,000 specimens of various kinds were examined in the laboratory. In the x-ray department, 5,215 diagnostic examinations were made, and 792 x-ray treatments; 1,806 ultra-violet ray treatments and 222 radium treatments were given. Admissions to medical wards numbered 958; to surgical wards 3,962. In the surgical division there were 1,743 operations; in the gynæcological division, 336; in the eye, ear, nose and throat division, 731. Of the patients admitted, 400 did not belong to Nova Scotia.

In his report for the year ended September 30, 1930, Dr. A. F. Miller, Superintendent of the Nova Scotia Sanatorium, makes it plain that he still adheres to the opinion that satisfactory results in the treatment of tuberculous patients are to be expected from the centralization of such patients in an adequately equipped institution rather than from the provision of tuberculosis annexes to local hospitals. During the year under review, 292 patients were admitted or re-admitted to the sanatorium, and 476 were under treatment. Chest examinations numbered 2,255; artificial pneumothorax operation, 2,255; phrenicectomies, 8; extrapleural thoracoplasties, 3. Nearly 6,500 x-ray examinations are reported, and more than 4,400 examinations of various materials were made in the laboratory. In addition to the work done at the sanatorium, members of the staff conducted 57 clinics at various centres for the Provincial Department of Health. A number of Dalhousie medical students received special training for periods of three months each. And 254 persons referred by practitioners for examination and report received the requisite attention. A new infirmary building is to be erected, which will provide for practically double the number of infirmary beds now available and increase the total accommodation to 350 beds.

The annual report of Dr. T. Ives Byrne, the Provincial Health Officer, recently presented to the legislature, states that there were no outbreaks of disease in epidemic form during the year ended September 30, 1930. Sporadic cases of infantile paralysis had been reported, but the incidence was not alarming. Convalescent serum had been prepared in anticipation of the appearance of the disease, and had been supplied

where required. A mild type of scarlet fever had been somewhat prevalent, and measles had accounted for 26 deaths. Twenty-four deaths had resulted from diphtheria—"a record of wanton sacrifice of human life"—and, because parents are neglectful in respect of immunization against diphtheria, consideration is being given to the establishment of educational and immunizing clinics at strategic points throughout the province. Whooping-cough had been responsible for 56 deaths. Two cases of smallpox, both mild, had been reported. Influenza had been fairly prevalent, especially in the more advanced age-groupings, and, with its complications, caused upwards of 500 deaths. The death rate from tuberculosis had again shown reduction. It is hoped that before long every case of tuberculosis in the province will be either institutionalized or under the strict supervision of the specialists and nurses of the Department of Health. Efforts at the control of the venereal diseases had been continued at the five free treatment centres maintained by the Department. Cancer had caused 16 more deaths than had resulted from tuberculosis. Deaths attributed to heart disease had numbered 645. Plans for enlargement of the nursing service are under consideration.

In the tuberculosis service, directed by Dr. P. S. Campbell, 2,310 chests had been examined. The tuberculosis death rate had been 99.6—the lowest rate yet reached. "The provision of a sufficient number of beds for the tuberculous is very important, nevertheless it is of lesser importance than the general field work in a control plan." In the laboratory, directed by Dr. D. J. Mackenzie, upwards of 16,000 specimens of various kinds had been examined, an increase of nearly 25 per cent over the previous year. Application of agglutination tests for *Br. abortus* and *Br. melitensis* to 500 specimens of blood selected at random had given results indicating a much more general prevalence of undulant fever than had been suspected.

The report on vital statistics is more comprehensive than for several years past. This deals with the year 1929. The birth rate was 20.4; the general death rate, 12.7; the infant mortality rate, 89.8. The rate for tuberculosis, all forms, was 99.6; for pulmonary tuberculosis, 86.4. All rates were based on the 1921 census.

W. H. HATTIE

Ontario

At a recent meeting of the Academy of Medicine, Toronto, three of our pioneer practitioners were in attendance in the persons of Dr. J. Price Brown, Dr. John Ferguson, and Dr. R. H. Robinson. It is interesting to note that the combined ages of these three doctors amount to 249 years.

An Osler Club has been organized at Queen's University Medical School, Kingston. The Osler Society of London was organized in 1927 by Dr. Wray Lloyd, now of the Rockefeller Institute of New York. At the February meeting of this Society, held at the Victoria Hospital, London, Carl G. Morlock read a paper on "The life of John Hunter", emphasizing the influence of the deductive logic of his Scotch ancestry, and the inductive logic of Bacon, on his life work.

Dr. S. G. Chalk, Instructor in Psychiatry, University of Western Ontario, has organized mental health clinics in eight cities in Western Ontario. It is gratifying to see the hearty cooperation given this work by the medical profession.

During the past nine months, nearly 700 volumes have been donated by interested friends to the Library of the Medical School of the University of Western Ontario. The Academy of Medicine, Toronto, donated a volume from the library of the late Dr. Jos. Workman.

Medical men from all parts of the Niagara District attended a meeting of the Niagara District Medical Association at the beautiful new Nurses' Home, Niagara Peninsula Sanatorium, St. Catharines, on Wednesday evening, April 8th. Dr. C. D. Parfitt, Superintendent of the Calydor Sanatorium, Gravenhurst, speaker of the evening, chose as his subject "Pitfalls in the diagnosis of tuberculosis" and handled it in such a manner that it was both interesting and instructive to those present. There was a good attendance and the evening's program concluded with a splendid dinner.

The annual meeting of the Ontario Medical Association will be held at the Clifton Hotel, Niagara Falls, on May 26th, 27th, 28th and 29th. A very excellent program has been prepared and the Local Committee has spared no effort in arrangements for the entertainment of the visitors during the Convention Week.

All reservations should be made direct to the hotel at which you wish to stay.

Do not forget to bring your golf clubs. The beautiful Golf Cup donated by the Hamilton Medical Society for annual competition will be played for on Tuesday and Wednesday.

It is hoped that a large number of ladies will be present. A good time is assured. Special drives, teas and bridge have been arranged.

J. H. ELLIOTT

Quebec

The Federation of American Societies for Experimental Biology met in Montreal from April 9th to 11th. This is the first time that Montreal has been selected as the place of meeting. The congress was a great success, not only on account of the important nature and high quality of the papers present but also because of the excellent attendance, more than six hundred members being registered. The meetings were held at McGill University and at the Mount Royal Hotel. The Canadian workers were well represented on the program. Papers of exceptional interest were those on the hormone of the suprarenal cortex, which were presented on the last day by Drs. Britton, Hartmann, and Pfiffner.

The next congress of the Federation will be held in Philadelphia.

The need for increased accommodation in the Montreal General Hospital, in both the central and western divisions, was shown in the reports presented on April 15th at the 109th annual meeting of the institution. The average bed occupancy in both sections over the entire year was almost 95 per cent, which, as Dr. J. C. Mackenzie, acting superintendent of the central division, pointed out means that for a considerable part of the time the hospital was overtaxed by from 5 to 10 per cent. Reports of services rendered showed increases in both in-patient and out-patient departments.

The president, Lieut-Col. Herbert Molson, C.M.G., M.C., presenting the report of the board of management, commented with gratification on the fact that the operating deficit of $91,604 was $55,000 less than that of the previous year. This saving was largely due to determined efforts to reduce operating expenses. In this connection a budget system was inaugurated with excellent results. With the assistance of the annual grant of $25,000 from the City and expected further aid from the Provincial Government, the board hopes to reduce its operating deficit greatly and eventually with adequate public support to wipe it out altogether.

Several greatly appreciated benefactions were received during the year, he stated. The largest was a gift by John C. Newman of $50,000 for the radium fund, supplementing a similar gift the year previous.

W. H. Robert and Miss S. M. Robert gave $10,000 toward a serum fund, and T. B. Macaulay volunteered to give the hospital a new electro-cardiograph machine at a cost of more than $5,000. A gift of $5,000 was made by Julian C. Smith for apparatus for the metabolism department. The board intends to set about making the needed extensions and alterations to the hospital in the near future.

A new development in the clinical work was the establishment of a varicose vein clinic, Dr. Mackenzie reported. Treatments numbered 24,476, an increase of 4,053 over the previous year. Increases were noted in the work of all the clinics, he stated, the largest increase, 14,887 treatments, being shown by the surgical clinic.

The in-patient department reported an increase of 2,170 patient-days. Treatment given under the Quebec Public Charities Act totalled 55,860 days, which helps to explain the operating deficit. The out-patients department gave 149,740 treatments, an increase of 9,219 over the previous year.

The 58th annual report of the western division, presented by the superintendent, Dr. Lorne Gilday, showed the same condition of overwork as in the central division. The percentage of occupancy was 95.42 per cent and the daily average of beds filled was 81, out of a total of 85. The Western Hospital admits an accident patient on an average once every three and one-half hours, day and night.

At the meeting of the Quebec Cabinet on April 16th an order-in-council was passed whereby the Montreal General Hospital was granted $25,000 per year for a period of 20 years.

The Cooke Hospital, Three Rivers, reports the total cost of construction and equipment of this splendid fireproof self-contained institution for the treatment of tuberculosis as $3,332.83 a bed for the 150 beds now operating.

In Quebec city the drinking water is now being chlorinated.

Saskatchewan

At the annual meeting of the Rural Municipalities, which was held at Prince Albert, the following resolution, submitted by the Rural Municipality of Dufferin, was carried: "Resolved that in view of the constantly increasing cost of medical services to the indigent sick of the municipalities, the time has now arrived for the province to assume the burden, and the provincial government is hereby petitioned to establish a scheme of compulsory contributory health insurance."

Ten of these medical resolutions were considered; six of them passed, one had no mover, one was referred back to the resolutions committee, and the other two were lost.

Dr. R. A. McLurg, of Wilkie, president of the Saskatchewan Medical Association, addressed the Convention. He related the troubles which faced the medical man in these days of stress. He stated that there were many who were not even making a living. The care of indigent patients was a problem not only of the municipalities but of the medical men. He stated that medical men are under no obligation nor compelled by law to treat indigent cases, but they treated them for the sake of humanity. They were not concerned with business, but in helping to save the health of the people. He thought that the cost of medical care had increased but only because so many people with slight ailments demanded specialists, private wards, private nurses and all the luxuries of hospitals. He said that the family doctor idea should be encouraged because he was in the best position to know the case thoroughly.

Saskatchewan's new Lieutenant-Governor is Lieut.-Colonel H. E. Munroe, O.B.E., V.D., M.D., F.A.C.S., of Saskatoon. He went to Saskatoon in 1904, where he was a member of the first city council and was largely responsible for the establishment of the first hospital services in Saskatoon. At the outbreak of the war he joined the Canadian Medical services, and went to England with the first Canadian contingent. He went to France in January, 1915, and after six months' service was transferred to the Dardanelles, where he served through the entire campaign there. Later, he contracted fever in Egypt and was invalided to England. From there he returned to Saskatchewan where he organized the Saskatchewan medical unit, which he later commanded in France. Finally he was transferred from this unit and acted as A.D.M.S. to the Independent Air Force in the south of France. Lieut.-Colonel Munroe graduated from McGill in 1902, later going to Edinburgh for post-graduate work.

A portrait of the late Dr. F. J. Ball, who was a member of the Regina General Hospital staff from 1907 until his death in 1928, was presented by the members of the staff to the hospital. Dr. S. E. Moore gave the address on behalf of the staff, and Mr. E. B. McGinnis received the portrait on behalf of the Board of Governors.

At the April meeting of the Regina and District Medical Society Dr. V. E. Black, of Moose Jaw, paid a tribute to Lord Lister. Dr. O. M. Irwin of Swift Current read a paper on "Pneumococcic peritonitis," illustrated by a case which had occurred recently in his district. Dr. W. S. Lindsay, of the University of Saskatchewan, gave an address on "The grading of cancer." Later the Canti film on cancer was shown.

LILLIAN A. CHASE

United States

1930 as the Country's Healthiest Year.—Health workers are now wondering whether the health record for 1931 can be made to equal or better that of 1930.

In spite of business depression and unemployment, 1930 was the healthiest year this country ever enjoyed, according to statistical reports of the Metropolitan Life Insurance Co., just issued. The company's reports refer particularly to the industrial wage-earning population of the United States and Canada.

Notable reductions in the death rate for tuberculosis, typhoid fever, the principal diseases of childhood, and pneumonia were found. The number of deaths from tuberculosis, diphtheria, and diseases of pregnancy and childbirth reached new low points.

Suicides increased markedly, but this death rate was lower than previous high figures recorded in the period from 1911 to 1916.

The cancer death rate increased very slightly.

Deaths from accidents were fewer during 1930 than in the previous year. This includes automobile fatalities which for the first time in 20 years showed a decline in the company's reports. However, the drop was so small as to be considered of slight significance.

The U. S. Bureau of Census has just reported an increase of 2 per cent in automobile fatalities.

Release of Cured Lepers.—Eleven patients at the National Leprosarium, Carville, La., are awaiting the arrival of the order from Surgeon General Hugh S. Cumming of the U. S. Public Health Service which will release them from the institution and permit them to return to their homes and normal occupations. These patients have been pronounced cured of the disease and no longer a menace to the community. They come from eight different states and have been here for

periods ranging from six years to eleven months. Since the U.S. Public Health Service took over the institution here ten years ago, 89 patients have been so released including these eleven.

The release of patients from this leprosarium is always the occasion for a celebration. Garlands of flowers are hung about the necks of the lucky men and women who are returning to the outside world, and there are other festivities.

Who the released patients are is generally kept a secret. Many of the patients register under assumed names and this is one place where the U.S. Government conspires with people to help them conceal their identities. No one need give his own name unless he wishes, and no one need submit to photography.

A Check on Vitamin Food Claims.—Buyers of food have become so vitamin-conscious that an expenditure of over $30,000 by the Food and Drug Administration will be required next year to check up on foods advertised as containing these important substances.

In presenting to the House Committee on Appropriations the necessity for the vitamin work, the Food, Drug and Insecticide Administration pointed out that to take action in cases where false claims were made for vitamin potency, it would be necessary to have scientific tests made, for which work the bureau is not equipped at present. It is believed that the public is being cheated of vast sums of money through being induced to purchase foods falsely advertised as rich in one or more of the essential vitamins.

The agricultural appropriation bill, passed by the House, and now before the Senate, carries an item of $30,200 for the vitamin testing work by the U.S. Department of Agriculture.

The Cost of Experimental Animals.—Congressmen who remember their boyhood days when they used to catch wild rabbits and sell them for fifteen cents apiece are staggered at the cost of pedigreed white rabbits needed for public health investigations.

Dr. L. R. Thompson of the U.S. Public Health Service told members of the House Appropriations Committee that approximately $17,278.00 will be needed for purchasing laboratory animals for the National Institute of Health in 1931. Wild rabbits cannot be used, he told the committee, because they are apt to have many different intestinal parasites, as well as tularæmia.

Guinea pigs for laboratory purposes cost about 90 cents apiece; rabbits, $1.35; white mice, 17 cents; monkeys, $16.00; chickens, $1.85; pigeons, 35 cents; white rats, 50 cents; frogs, 11 cents; and cats, 50 cents.

The establishment of an animal farm where the Health Service can raise its own animals was suggested.

Hospitals for Negroes in the United States.—In 1929 there were listed on the Hospital Register of the American Medical Association 122 hospitals. In addition to those listed then are some 30 more. Nearly 82 per cent are located in the Southern States. There are 11,667 beds in these 122 hospitals. Fourteen are approved for interneship.

General

Royal College of Physicians and Surgeons of Canada

REGULATIONS FOR CANDIDATES RELATING TO THE EXAMINATION FOR THE DIPLOMA OF FELLOW

SECTION I

Examinations

1. The Examination for the Fellowship is divided into two parts, *viz.*, the first examination, or Primary; and the second examination or Final.
2. The subjects of the Primary Examination are:—
   I. Anatomy, including Histology and Embryology.
   II. Physiology, including Biochemistry.
   NOTE: *In the case of candidates who have graduated in Medicine in 1925 or prior thereto, a general knowledge of these subjects will be required.*
3. The subjects of the Final Examination are:—
   (a) For the Fellowship in Medicine:
      I. The Principles and Practice of Medicine, including Therapeutics, Preventive and Forensic Medicine.
      II. Pathology, including Bacteriology.
      III. Also, one or more special branches of Medicine if elected by the Candidate and approved by Council.
   (b) For the Fellowship in Surgery:
      I. The Principles and Practice of Surgery, including Operative Surgery and Surgical Anatomy.
      II. Pathology, including Bacteriology.
      III. Also, one or more special branches of Surgery if elected by the Candidate and approved by Council.
4. The Primary Examination is partly written and partly oral, and must be passed as a whole. The Final Examination is partly written, partly clinical and partly oral, and also must be passed as a whole.
5. The Primary and Final Examinations are held in the month of September or October. The exact date and place will be announced annually before July 1st.

SECTION II

Conditions of Admission to the Primary Examination

1. The Primary Examination may be taken at any time after the candidate has completed a course of study and passed the examinations in Anatomy, Histology, Embryology, Physiology and Biochemistry in a Medical School or University approved by Council. The candidate must submit a certificate thereof with his application.
2. Application for the Examination must be submitted before July 1st, on the proper form.

SECTION III

Conditions of Admission to the Final Examination

1. A candidate must have passed the Primary Examination of this College.
   NOTE: *In lieu of this, the Primary Examination of the Royal College of Surgeons of England will be accepted.*
2. The candidate shall be a graduate of not less than three years' standing of a Medical School or University approved by Council.
3. The candidate must produce evidence of having been engaged in the study (or study and practice) of the profession for not less than three years subsequent to the date of obtaining the medical degree, one year of which shall have been spent in attendance upon the medical or surgical practice of a hospital approved by Council.
4. The candidate shall hold a licence to practise Medicine in at least one of the provinces of Canada.
5. When applying for admission to the Final Examination, a candidate must elect to be examined for either the Fellowship in Medicine or the Fellowship in Surgery.
6. Application for the Examination must be submitted before July 1st, on the proper form.

SECTION IV

Languages of Examination

Candidates at the time of making application for either the Primary or the Final Examination shall indicate whether they desire to be examined in the French

AZNOE'S CANADIAN PHYSICIANS AVAILABLE — (A) M.D., Manitoba, Protestant, age 25; rotating internship; 2 years general practice including superintendency small hospital; wants further surgical experience. (B) M.D., Laval University, Catholic, age 30; rotating internship; 3 years first class training Olar work, desires assistantship Olar specialist. No. 3596, Aznoe's National Physicians' Exchange, 30 North Michigan, Chicago, Illinois.

VACANCY FOR TWO WOMEN INTERNS in General Hospital July 1st. 100 beds, including surgical, medical, pædiatric and obstetrical service. Venereal and mental clinics. Salary and maintenance. (In the State of Pa. about 2½ hours ride from Philadelphia). Apply Box 111, C.M.A.J., 3640 University St., Montreal.

FOR SALE—Medical practice. Extra large territory in Saskatchewan's most favoured Anglo-Saxon district. No opposition. Cottage hospital maintained by community. Will sell for value of property on easy terms. Doctor taking post-graduate work. This is worth investigating. Apply Box 149, C.M.A.J., 3640 University Street, Montreal.

WANTED—Interns in active 500 beds general hospital—one year beginning July 1st—allowance and maintenance based on experience—French language necessary. Apply superintendent, hôpital Notre-Dame, Sherbrooke St. East, Montreal, Can.

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SHANGHAI MUNICIPAL COUNCIL—PUBLIC HEALTH DEPARTMENT ASSISTANT PATHOLOGIST

An additional Assistant Pathologist is required in the Public Health Department of the Shanghai Municipal Council.

Candidates preferably unmarried, should not be more than thirty years of age and must hold qualifications in medicine and surgery of University standard. In addition, they must have working experience of the routine of a Pathological Laboratory and practical knowledge of the manufacture of bacterial vaccines in bulk is desirable. Experience in Tropical Medicine would be a recommendation.

Salary for three years Tls. 650 per mensem or Tls. 700 per mensem if holding a Diploma of Public Health or its equivalent. Thereafter rising by triennial increments of Tls. 100 to Tls. 1250 or Tls. 1300 if with Diploma of Public Health, subject to satisfactory service. After six years on the maximum Pay, a final long service increase of Tls. 100 per mensem is granted. A Tael at the present rate of exchange equals about 32 cents U.S. Gold. Exchange is, however, subject to fluctuation.

Service is under Letter of Appointment which is for three years in the first instance.

Owing to the present adverse exchange rates the Council, under certain limitations, guarantees one-third of pay at the rate of 2s/6d to the Tael. Further particulars may be obtained on application.

First class passage is provided with half pay during the voyage, and 7 months' leave is given on full pay, with first class passage, after every period of 5 years' service in Shanghai.

Free Medical attendance and Hospital accommodation in accordance with the Council's standard rates are provided and there is participation in the benefits of a Superannuation and Pension Fund.

Full particulars of the vacancy and the Terms of Service in force for Municipal employees may be obtained from the Council's Agents.

Applications with full information as to qualifications, experience, etc., accompanied by three recent testimonials and endorsed "Assistant Pathologist" should be forwarded to

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Copper (as Carbonate)	1/48 gr.
Phenolphthalein . .	1/12 gr.

*Approximately three grains of iron in the *Ferrous* state.

DOSE:—One capsule three times daily, after meals.

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"Cases of this disease of long duration were treated with a combination of iron and copper in capsules given by mouth. Prompt improvement followed in all cases, with restoration of the blood to about its normal level." *Mills, C.M.A.J., Feb., 1930.*

This formula, originated in the "Frosst" Laboratories, was presented to Canadian Physicians after an experimental study had conclusively proved its effectiveness.

Many gratifying reports have since been received, from Canadian physicians, indicating more than usually satisfactory results from the administration of this preparation.

Syrup: For use in cases where administration by capsules is unsatisfactory (as with children) **Syrup Ferro-Catalytic** is at the physician's disposal.

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Yours truly.

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or English language. Application forms may be obtained in either language.

SECTION V

Fees

The fees for the Examinations and Diploma are as follows:—

Primary Examination .	$ 50.00
Final Examination	100.00
Admission to Fellowship	100.00

Fees for examinations must be deposited with the Registrar-Secretary prior to the 15th of August, and all cheques made payable at par in Toronto.

T. C. ROUTLEY,

Registrar-Secretary, Royal College of Physicians and Surgeons of Canada.

N.B.—All communications with reference to examinations for the Fellowships should be addressed to the Registrar-Secretary, Royal College of Physicians and Surgeons of Canada, 184 College Street, Toronto.

Royal College of Surgeons of England.—Arrangements have been made by this body to hold a Primary Examination in Toronto, commencing on October 20, 1931. Dr. E. Stanley Ryerson, Secretary of the Medical Faculty, University of Toronto, has been appointed Superintendent of the Examination. The Examiners appointed by the Royal College are Prof. William Wright (Anatomy) and Prof. G. A. Buckmaster (Physiology).

Tuberculosis Sanatoria in Canada now contain over 7,000 beds, cost annually for upkeep over $7,000,000, care for nearly 15,000 tuberculous annually, and have an estimated replacement value of $18,000,000.

Exempted Heroin Preparations. — When the Geneva Convention was ratified in 1928 the section of the Dangerous Drugs Act, 1923, which gave power to add all preparations of diamorphine to Part III of the Act of 1920, came into operation. The Pharmaceutical Society of Great Britain however approached the Home Office with a request that certain preparations should be exempt from the Act. We have received from the Home Office a copy of an Order—The Dangerous Drugs (Consolidated) Amendment Regulations, 1931—from which it is seen that this request has now been granted. The delay was due to the fact that it was necessary for the application to be approved in succession by a Committee in Paris, passed on to the Opium Advisory Committee and the Council of the League of Nations. This process having been completed, and confirmation obtained from the League, the Home Office was duly authorized to promulgate the Order. In anticipation of the publication of the new regulations, and by arrangement with the Home Office, the formulæ of the five exempted preparations have been published as a supplement to the British Pharmaceutical Codex. The preparations are as follows:—

1. Elixir diamorphinæ et terpini cum apomorphina.
2. Linctus diamorphinæ camphoratus.
3. Linctus diamorphinæ cum ipecacuanha.
4. Linctus diamorphinæ et scillæ.
5. Linctus diamorphinæ et thymi.

In the case of each formula the proportion of diamorphine hydrochloride is grs. 4 to 20 fluid oz. of the preparation, or 0.046 per cent. In the first and last of the two formulæ there is also grs. 5 of apomorphine hydrocholoride to 20 oz. of the preparation, or 0.057 per cent. The maximum dose in each case is a fluid drachm, and thus the amount of diamorphine hydrochloride in a maximum dose is one-fortieth of a grain. It may be added that these preparations are free from the restrictions which apply to all other preparations of heroin.—*The Lancet*, 1931, **1**: 599.

Wireless Consultations.—For ships without a doctor the German authorities have arranged that application for medical advice may be made by wireless. A medical man on duty in the State Hospital in Cuxhaven, near Hamburg, is instructed to answer inquiries. Messages from foreign ships in English, French, or Spanish are translated for him and his prescriptions are in turn translated in the appropriate language. These arrangements are certainly likely to be helpful.

Dangers of Cosmetic Surgery for the Surgeon.—A dressmaker in Paris sought surgical help for excess of fatty tissue on her right leg. Dr. Dujarrier had her admitted to the Boucicault Hospital, where he did his best, by a plastic operation, to remedy the defect and charged no fee. The operation was followed by gangrene, and the right leg had to be amputated. Seeking material consolation for this tragedy, Madame Le Guen sued her would-be benefactor last year for half a million francs. She was awarded 200,000 francs. This award was accompanied by the judicial rider that to undertake a really dangerous operation on a healthy limb with the sole object of correcting its outlines is to involve the surgeon in an indefensible dilemma. On March 2nd of this year this verdict came up for revision, and though it was not reversed altogether in Dr. Dujarrier's favour, certain passages therein were emphatically disavowed. It was pointed out that the rider attached to the original verdict was nothing more nor less than a condemnation of all cosmetic surgery, and was contrary to the principles of liberty in the practice of surgery. It was held that the grounds for awarding damages against Dr. Dujarrier should be shifted. He was to blame because he had failed to give his patient clear warning of the serious risks she ran in undergoing the operation. Not only should the exact nature of the dangers of such an operation be explained to the prospective patient, but her consent thereto obtained in the light of this explanation. All this means that cosmetic surgery is not banned wholesale, as its devotees had good reason to fear it was by last year's judgment, but the operator has to take more precautions than in an operation undertaken to benefit a patient's bodily health.—*The Lancet*, 1931, **1**: 774.

Book Reviews

Observations on the Courses of Different Types of Bright's Disease and on Resultant Changes in Renal Anatomy. D. D. Van Slyke and others. Vol. 17. 130 pages, illustrated. Price $3.00. Williams & Wilkins Co., Baltimore, 1930.

This monograph presents the results of a special study caried on for 5 years on a series of cases of nephritis at the Hospital of the Rockefeller Institute. From this series 67 cases were selected, and the findings, clinical, chemical and pathological (where available) are presented in considerable detail. Methods of treatment are not discussed beyond incidental reference in the case reports.

The subject matter may be divided into three sections: The first consists of an introduction dealing with the history of kidney disease and a description of the nomenclature. The authors adopt a classification closely resembling those of Volhard and Fahr, and of Addis. Nephritis is divided clinically into two types: Hæmor-

rhagic Bright's Disease (glomerulo-nephritis) and the Non-hæmorrhagic. The latter is further subdivided into Arteriosclerotic (nephrosclerotic) and Degenerative Bright's Disease (nephrosis). For their pathological descriptions Fahr's anatomical terminology has been followed.

The second section deals with the significance of the clinical data presented: the information to be gained by a study of the blood urea clearance; the relationship of plasma protein content and œdema; the importance of the degree of albuminuria, of anæmia, and of the blood pressure values, in the diagnosis and prognosis of the disease process. The third section contains 3 subdivisions, containing fairly detailed discussion of the history, clinical findings and pathological material of (a) 50 cases of hæmorrhagic or glomerulo-nephritis; (b) 6 cases of arteriosclerotic Bright's disease; and (c) 10 cases of degenerative Bright's disease.

In each of these sub-divisions, the correlation between the clinical findings and the pathological material is made a feature, and this is one of the satisfactory features of the monograph. There are numerous charts, the usefulness of which suffers from their reduction in size although they serve to give a general impression of the progress of the disease. The same criticism regarding size, applies to certain of the microphotographs. The publication is particularly valuable in its presentation of the hæmorrhagic or glomerulo-nephritic picture, and also serves a useful purpose in showing how difficult it may be to distinguish between chronic glomerulo-nephritis and chronic nephrosis, at certain stages in the life history of the former type of disease. It should have a distinct place as a useful epitome of our knowledge of certain types of kidney disease.

Quantitative Clinical Chemistry. Vol. 1. Interpretations. John P. Peters, M.D., M.A., Professor of Internal Medicine, Yale University, and Donald D. Van Slyke, Ph.D., Sc.D., Member of the Rockefeller Institute for Medical Research. 1264 pages, with charts. Price, $12.00. Williams & Wilkins, Baltimore, Md., 1931.

Had these two distinguished authors combined merely to give us a review of their own researches in this field, the result would have been a most useful and valuable work; but they have done far more than that. They have given generously of their time and patience, in collecting, digesting, and expounding the voluminous literature of the subject, and thereby have placed all its students in their debt. There are already in existence a number of books which seek to explain to the clinician the value of the information which laboratory data, properly used, can give, or to introduce the biochemists to the clinical aspects of their subject; but none of these can be compared with the present volume. It will be invaluable for reference: some four thousand articles are listed in the bibliographies, but this mass of information has been so critically handled and so deftly incorporated into the text that the book is orderly, coherent, and readable, though of necessity concise. There are many excellent charts and diagrams, though it must be admitted that some of them are too intricate to be demonstrative.

A work so comprehensive could hardly be faultless; and it is clear that neither author is interested in the chemical nature of the substances discussed. Thus the second chapter, which deals with carbohydrates, begins unpromisingly with hopelessly incorrect formulæ for lactose, maltose, and glucosamine; and the formulæ given for glucose and methyl glucoside have now been abandoned by most workers—as the text inconspicuously hints. In the third chapter, it is said of the sterols that they "all contain a doubly-bound carbon atom", which is meaningless (since a double bond must involve *two* carbon atoms) and untrue (since coprosterol, for example, is saturated). No indication is given that the sterols are alcohols; and there is an amazing reference to the *choline* content of cholesterol (two more dissimilar substances could hardly be imagined; one hopes that the authors intended to write *cholane*, which would be only a minor inaccuracy). The suggestion (p. 523) that cytochrome is identical with Warburg's "respiratory ferment" is fortunately recanted eighty pages later. The discussion of parathyroid extracts might well lead the novice to suppose that oral administration was therapeutically practical. It is quite unjustifiable to suggest that the inactive product which, as Van Slyke himself has shown, so often results when purification of hæmoglobin is attempted, is a "tautomeric form" of the natural protein. About a score of minor misprints have been noted.

Such mistakes, though regrettable, do not seriously detract from the value of the book; in its own true field, exactly defined by the title, it is entirely praiseworthy. A second volume, dealing with laboratory methods, is to appear shortly; but this first volume is complete in itself. Many clinicians, many biochemists, and all liaison officers between these forces will welcome it to a place on the most accessible of their shelves.

A Textbook of Surgery. John Homans, M.D., Assistant Professor of Surgery, Harvard Medical School. 1195 pages, illustrated. Price $9.00. Charles C. Thomas, Springfield, 1931.

This book is a survey and summary of the lectures, publications and works of 23 members of the Surgical Department of the Harvard Medical School. The names of Cushing, Cheever, Greenough and Jones among these emphasize the eminence of the contributors; and the broad scope of the volume, its fineness of detail and wealth of personal experience in so many specially developed subjects, make it stand out as a surgical textbook of unusual value.

The illustrations, of which there are over five hundred, are clear and are of clear-cut anatomical character and value. One does, however, miss the coloured illustrations and the photographs which have become so much a part of up-to-date works in surgery. It does not read, as so many surgical works do, as a patchwork of diseases and parts; but it has a continuity obtainable only where each subject is handled by a master and in his own way. Special mention must be made of the chapter on suppurative inflammation. No student, practising physician or operative surgeon can fail to find here information in regard to general principles of treatment and details of operative procedure which are up-to-date in scientific development, and effective in preventing mutilation and deformity in the treatment of these conditions, which are after all the commonest requiring surgery. Kanavel's work, methods, incisions, and treatments are clearly shown in the part devoted to infections of the hand.

Chapters are devoted to the eye, the ear, genito-urinary diseases and gynæcology, so that a well rounded out work is embodied in over eleven hundred pages of thin paper, in a not too bulky volume.

The book will be welcomed by any graduate, but most certainly will be assured a cordial reception from the graduates of the school that gave it birth.

Internal Medicine. Sir Humphry Rolleston, G.C.V.O., K.C.B., M.D., Hon. D.Sc., LL.D., Regius Professor of Physic in University of Cambridge. No. 4. 92 pages. Price $1.50. Paul B. Hoeber, Inc., New York, 1930.

The prefaces of the Editor, Dr. E. B. Krumbhaar of Philadelphia, amply suffice to justify and promulgate the *raison d'etre* of this charming little volume. For the reviewer there is little left to do but to reiterate the oft repeated eulogia of Sir Humphry Rolleston's authorship. Followers of the art and science of internal

medicine will welcome this history of "Physic" which covers a period extending from the time of prehistoric man to the beginning of the fourth decade of the twentieth century. The task of presenting the evolution of our profession in a consistent, coherent, and scientific manner is one to tax all the literary reserves of a historian. It requires a fully matured, experienced, medical mind to cope with it, but there is also the necessity of a mentality richly seasoned with the general culture acquired by living among those who represent to-day the finest traditions of Medicine. The carefully and concisely worded text, a text of elegant and dignified English, is indicative of the full possession of these requisites by the author.

In addition to a panoramic visualization of the philosophies, there is presented an intimately associated biographical review of the great medicine men who have contributed to the high seriousness and effectiveness of our profession in society and state. Very satisfying are the *precis* perspectives of the more important diseases that have emerged from the chaos of sorcery and incantations to science and efficient therapeusis. And each of these is illustrated with a verbal portraiture of its heroes in their Halls of Fame. Moreover, nationalism and internationalism receive in the text their just assessment in the growth of "Physic." The temples of the Asclepiadæ and of the Mayos are in striking contrast. The philosophies of ancient magic and modern research are dexterously correlated by evolutionary logic. At opposite ends of the corridors of time we find Banting, Best, Minot and Murphy linked up with the "Sons of Pæon."

Apart from its highly entertaining qualities the text offers a veritable mine of reference which is enriched by a carefully edited index composed of two parts, one given to the personal names and the other to the subjects of the text. This will be of outstanding value to historical essayists.

Clio Medica, Internal Medicine, is an euphoric stimulant to internists in acquainting themselves better with their great traditions in a noble calling.

Lectures on Diseases of Children. Robert Hutchison, M.D., F.R.C.P., Physician to the London Hospital and to the Hospital for Sick Children, Great Ormond Street. Sixth edition. 487 pages, illustrated. Price 21/- net. London: Edward Arnold & Co., 1931.

The appearance of this popular book in its sixth edition, revised and enlarged, will be welcomed. The plan of the volume remains the same, the text being revised to bring it abreast of present knowledge, and amplified by the inclusion of new chapters on Asthma in Childhood, Chronic Splenomegaly in Childhood, and Diet after the Period of Infancy, while the lecture on The Dyspepsias of Childhood has been rewritten. The emphasis is placed on the peculiarities of disease in children, those disorders having a common symptomatology in the child and the adult receiving only brief mention. Pathological problems and questions of academic interest are relegated to the background while diagnosis and treatment are discussed in detail. Such chapters as The Problem of the Solitary Child, Hysteria in Children, Some Common Symptoms of Disease in Children and Their Diagnostic Significance, and Fever of Obscure Origin and of especial interest, punctuated with telling epigram and illuminated with the clarity and understanding born of wide experience. Like its predecessors this volume is not intended as a text-book of pædiatrics. As a record of the lectures of a great clinician to his London students, it will be a valuable aid to the student in acquiring the broad principles of pædiatrics; as a reflection of the wide experience of an eminent clinician these lectures, in a style sometimes intimate and always easy, will continue to hold the interest of the practitioner and pædiatrist.

Diseases of Infants and Children. F. M. B. Allen, M.D., M.R.C.P., Assistant Physician to the Belfast Hospital for Sick Children, etc. 595 pages. Price $3.75. London: Baillière, Tindall & Cox, 1930.

This is of the "handbook" type and should be of value to the student in preparing for examinations, but the descriptions, though accurate and concise, are not of sufficient length to qualify it as a work of reference. Only in some of the details in infant feeding does the writer differ from the practice of pædiatrics as taught in Canada at the present time. Tomato juice is not mentioned as an antiscorbutic. The doses of cod liver oil and irradiated ergosterol recommended are much lower than those now in use in Canada. He limits the amount of sugar that can be tolerated by the infant to 1 ounce, while we normally use 1½ ounces per day in the infant over 12 pounds in weight. We disagree with the author's statement that "Even pasteurization at 158° for at least half an hour is not considered as sufficient to kill tubercle bacilli." We do not believe that the boiling of milk has been overrated and feel sure that it does more than simply destroy vitamin C.

Chronic Nasal Sinusitis and Its Relation to General Medicine. Patrick Watson-Williams, Hon. Consulting Surgeon in Diseases of the Ear, Nose and Throat, Bristol Royal Infirmary, etc. 221 pages, 109 illustrations. Price $4.50. Bristol: John Wright & Sons, Ltd.; Toronto: Macmillan Co. of Canada, 1930.

The relationship existing between general medicine and nasal accessory sinuses has in recent years undergone very careful investigation by many pathologists, oto-laryngologists and physicians. The author has long been the leader of those who believe the mucosa of the nasal accessory sinus contains the septic focus of many obscure phenomena witnessed in a large variety of diseases.

Special stress is laid upon the necessity for greater precision in diagnostic measures. The nasopharyngoscope is highly praised. Diagnostic exploral suction, a method of determining if a cavity is septic introduced by the author in 1919, is very fully described. Several chapters are devoted to the connection between general medicine and sepsis in the sinuses. The author's enthusiasm has carried him probably further than most rhinologists would care to go. So long as this does not lead to unnecessary surgery, it does not matter much if a little liberty is allowed. It is only fair to say that the author deprecates all meddlesome surgery.

There is no book quite like this one, and it takes up a field in which rhinologists are far from agreement. The work is written by one who has a wide knowledge of general medicine, and should be in the library of all rhinologists. Physicians will find considerable help in understanding some of the problems they and the consultant have to solve in seeking for focal sepsis, and will become more familiar with some of the newer diagnostic aids and their limitations.

Roentgen Interpretation. A Manual for Students and Practitioners. George W. Holmes, M.D., Roentgenologist to Massachusetts General Hospital and Howard E. Ruggles, M.D., Roentgenologist to the University of California Hospital. Fourth edition. 339 pages, illustrated. Price $5.00. Lea & Febiger, Philadelphia, 1931.

The fourth edition of this useful work by such well known authors should be welcomed by the practitioner of general medicine as well as the roentgenologist. The bibliography is sufficiently full to provide satisfactory reference work and this is perhaps of special value to students. The amount of space allotted to the discussion

of technique is happily reduced to a minimum and this allows a wider description of the pathological information available in x-ray films. Much space is naturally given to the study of the normal and abnormal bony skeleton. Bone tumours are as well covered as may be in a general volume. The examination of the heart and lungs, gastro-intestinal tract, gall bladder and genito-urinary tract is taken up in separate chapters. New paragraphs have been added to indicate the value and findings in the use of the Graham test for gall-bladder diagnosis, and the same has been done for the investigation of the genito-urinary tract by uroselectan. From the standpoint of the roentgenologist, some of the descriptions have been subjected to the maximum of condensation, but this very thing is in favour of the book as a manual for the practitioner and student. The volume is well printed and the paper used brings out the best in the illustrations. The final chapter of the book on fluoroscopic technique, covering equipment, protection, accommodation, secondary current, and the procedure in examination for foreign bodies, chest and gastro-intestinal disease is a very valuable one.

Therapeutic Uses of Infra-red Rays. W. Annandale Troup, M.C., M.B., Ch.B., with Foreword by Sir Wm. Willcox, K.C.I.E., C.B., C.M.G., M.D. 57 pages, illustrated. Price $1.50. London: The Actinic Press, 17 Featherstone Bldg., 1930.

In this volume useful information is given regarding the most valuable wave-lengths for this form of therapy, since it is a fact that many so-called infra-red lamps are of very doubtful value. There is equally no doubt that infra-red rays properly used have a definite place in physiotherapy. This is the first book to speak with authority on the subject, and, after the discussion of apparatus, there are chapters dealing with the practical uses in such conditions as the neuralgias, rheumatism and allied conditions, sprains and other miscellaneous conditions in which the application of heat is of value.

Annals of the Pickett-Thomson Research Laboratory. Vol. 6. The Pathogenic Streptococci. 470 pages. Price $10.00. Published for Pickett-Thomson Research Laboratory by Baillière, Tindall & Cox, London, Eng.; Williams & Wilkins Co., Baltimore, 1930.

This volume is a further addition to the ambitious plan of the authors to cover in review the whole field of studies on the streptococci. Volume III was devoted to a very full historical survey of research on the streptococci. Volume IV dealt with the pathogenic streptococci in rheumatic fever, chorea, erythema nodosum, carditis, acute suppurative arthritis, chronic arthritis and a study of Rosenow's hypothesis of elective localization. Volume V continued the study in relation to oral and dental sepsis, tonsillitis and pharyngitis, puerperal sepsis and septic abortion. The present volume is a most useful compilation of the work done on streptococci in scarlet fever, and is conveniently subdivided so that information on almost any phase of the problem of the etiology of scarlet fever can be readily obtained. The Dick test is discussed from numerous angles, and the use of antitoxin, convalescent sera and active immunization finds ample space. The mode of infection, the varieties of scarlet fever, mortality, complications, questions of specificity and views of different authorities on the debatable points are all available in condensed form. The enormous literature and the divergent opinions which have made it all but impossible for anyone to get a clear view of the problems involved are now presented so that the benefit of the analytical study of so much material is open to all. No one interested in scarlet fever or any of the other diseases caused by streptococci can fail to appreciate what valuable contributions these volumes of the Thomsons are to the busy physician or research worker. The authors give in a summary their conclusions enumerating the proofs to sustain their belief that scarlet fever is caused by a specific hæmolytic streptococcus—the *S. scarlatinæ*.

An Outline of Chemistry. Sister M. Domitilla, B.S., R.N., Educational Director and Instructor at St. Mary's School of Nursing, Rochester, Minn. 198 pages. Price $1.50. London and Philadelphia: W. B. Saunders Co.; Toronto: McAinsh & Co., 1931.

This outline has been compiled as a guide in the teaching of chemistry to nurses-in-training by a writer who has had a wide experience in the teaching of this subject. The outline is a compilation of the fundamentals necessary to an understanding of simple chemical reactions and it includes phases of chemistry which are of special interest to nurses. To follow the course suggested, it is not essential that the pupils have had previous instruction in chemistry.

The book is arranged as a series of lessons, in which directions for experiments are interspersed with relevant explanations of the principles and phenomena under consideration. The practical application to medicine is given in a series of questions relating to each lesson. Closely allied subjects, such as basal metabolism, oxygen therapy and the digestion of foods, are well covered, and blank pages for notes and experimental observations are freely interspersed throughout the book. Perhaps the course as outlined is more complete than would be given in the average training school; also, in a working manual, the binding might be a little more durable and the size of the page reduced somewhat. This book will be of interest and value to those engaged in the teaching of chemistry to nurses.

A Handbook for Senior Nurses and Midwives. J. K. Watson, M.D., Assistant House Surgeon, Sheffield Royal Infirmary and Sheffield Royal Hospital. Second edition. 676 pages, illustrated. Price $3.75. London: The Oxford University Press; Toronto: McAinsh & Co., 1931.

This well written handbook has now appeared in its second edition. The author has undertaken the formidable task of covering the vast field of medicine, surgery, pædiatrics, obstetrics and gynæcology in one volume, and has succeeded in concentrating a vast amount of information in its 676 pages. Fortunately, rather than trying to compile a comparatively useless catalogue of the many diseases included in these major groups, the author has selected a limited number of subjects in these various specialties and thus has been enabled to treat them with sufficient fullness to make them of genuine value to the reader. The fifty topics chosen are either those which are commonly encountered in nursing practice, as for instance diseases of the gall bladder, infant feeding and abnormal labour, or they are topics which are of especial interest at the present time, as for example, the ductless glands, the problem of cancer, vaccination, deformities, the tonsils, dental defects in children, etc.

The section on obstetrics has been enlarged in this edition and contains an interesting chapter on maternal mortality. Also, the method of conducting a twilight-sleep labour is well depicted. The book, which is very well illustrated, is written for senior nurses and midwives, but contains considerable information of interest and value to senior medical students and practitioners. This volume does not go fully into the nursing details of the subjects treated, nor does it completely review the fields of medicine covered, but, as the author points out, it is to be regarded as supplementary to the more elementary and systematic works, providing more detailed and complete knowledge on selected subjects than is possible in such books. This handbook is worthy of recommendation.

A Text-book of Laboratory Diagnosis. With Clinical Applications for Practitioners and Students. Edwin E. Osgood, M.A., M.D., Assistant Professor of Medicine and Biochemistry, Director of Laboratories, University of Oregon, School of Medicine, Portland, and Howard D. Haskins, M.D., Professor of Biochemistry, University of Oregon, School of Medicine. 475 pages, illustrated. Price, $5.00. P. Blakiston's Son, 1012 Walnut Street, Philadelphia, 1931.

The authors have written a most comprehensive book on this subject. Their official connection with a large institution insures abundance of material for study and extensive experience. The subject matter has been well divided, properly apportioned and treated in a clear and practical manner. Even the most trivial details in biochemistry received careful attention and study. The section on hematological studies has been particularly well treated. The special grouping of technical methods in the latter half of the book is a great advantage in making this part of the information easily available. The general adoption of the plan for the use of oxalated blood for complete hæmatological studies is a departure from the orthodox routine methods in vogue. The results obtained by these methods compare most favourably with those obtained by the old cumbersome routine. The convenience of the method in no way detracts from scientific accuracy. The treatment of the subjects in the first part of the book is quite thorough and modern. The book will be of considerable value not only to students and practitioners, but will appeal also to all laboratory technicians. The style is clear and simple. Each subject is exhaustively studied and there is a generous reference to the literature at the foot of each page which leaves an impression of serious thoroughness and adds authenticity to controversial questions. The book will be a useful addition to the library of the student and practitioner, a great help to the laboratory technician and of inestimable value to teachers of practical laboratory methods and clinical microscopy. The sections on the urine, sputum and fæces are also exhaustively studied and there are many useful suggestions. One is impressed by the large number of references to the authors' own publications as well as by the numerous original ideas and suggestions. We recommend the book unhesitatingly. In conclusion, we wish to congratulate the authors on their beautiful illustrations and colour plates. The latter are simply magnificent.

BOOKS RECEIVED

Chinin in der Allgemeinpraxis. Dr. Med. Fritz Johannessohn, Mannheim. 232 pages. Bureau tot Bevordering van Het Kinine-gerbruik, Amsterdam-W. 1930.

Easier Motherhood. A Discussion of the Abolition of Needless Pain. Constance L. Todd. 199 pages. Price $2.00. John Day Co., New York, 1931.

International Clinics. By various authors. Vol. 1, 41st series. 307 pages, illustrated. Philadelphia, London, and Montreal: J. B. Lippincott Co., 1931.